1824
XLIV

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FLIGHT

and The AIRCRAFT ENGINEER

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

DECEMBER 9th, 1943

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FLIGHT and The AIRCRAFT ENGINEER

First Aeronautical Weekly in the World : Founded 1909

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Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams: Truditur, Sedist, London. Telephone: Waterloo 3333 (35 lines).

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Telegrams: Autocar, Coventry.	Telegrams: Autopress, Birmingham.	Telegrams: Iliffe, Manchester.	Telegrams: Iliffe, Glasgow.
Telephone: Coventry 5210.	Telephone: Midland 2971 (5 lines).	Telephone: Blackfriars 4412.	Telephone: Central 4857.

Registered at the G.P.O. as a Newspaper.

No. 1824. Vol. XLIV. December 9th, 1943. Thursdays, One Shilling.

The Outlook

"Harrissing" Berlin

WHILE no decent-minded person would dream of gloating over the sufferings which Bomber Command of the Royal Air Force must inevitably inflict upon large numbers of German civilians in the course of its night raids, or those caused by our American friends of the Eighth U.S. Army Air Force in their devastating daylight raids, there is a clearly perceptible tendency in certain quarters to let sentiment overrule reason, and to forget that it was Germany which started this form of warfare.

It is therefore well that these matters should be put in their true perspective. Germany, as was to be expected, is howling now that she is being hit, and memories are notoriously short. Masses of people are beginning to forget that there was a time when we in this country were the sufferers, and that at a time when we stood alone in the world.

In the House last week Sir Archibald Sinclair reminded one critic that Berlin is the centre of 12 strategic railways; is the second-largest inland port in Europe; is connected with the whole German canal system; has large precision instrument factories engaged solely on war work; and that such firms as A.E.G., Rheinmetall, Siemens, Focke-Wulf, Heinkel and Dornier have factories there. That is more than sufficient to make Berlin a legitimate target.

As for the squealing now going up from Berlin, *The Daily Telegraph* of November 30th did good service by publishing on its leader page an article by Alan Dick in which he recalled not only the sequence of bombing raids by Germany and by us, but quoted some of the many exultant comments with which German papers and radio were flooded at the time when we had to "take it."

As Alan Dick says in his article: "In the winter of 1940 these people had the impudence to coin the word 'Coventrate.' They now seem to profess the odd philosophy that any weapon or any method of warfare is a shining sword in the hands of the Nazis and an assassin's knife in the grasp of their enemies."

3-in. Guns in Aircraft

NOT inappropriately, the aircraft chosen for first installation of the 75 mm. cannon is the North American Mitchell. "Billy" Mitchell, the American general, was put down by vested interests and politicians because he put too much "punch" in his advocacy of air power. That was twenty years ago or so. The Mitchell of 1943 is not likely to be downed by politicians, Japs, Germans or anyone else.

Attempts to fit guns of fairly heavy calibre in aircraft go back quite a few years. In World War I an American inventor, Mr. Davis, produced a large non-recoil gun which, it was said, had so little recoil that it could be held on a man's shoulder while being fired. The principle, roughly, was that the gun barrel was a sort of "opposed pistons" affair. The charge was in the centre, and as the projectile was fired out of one end of the barrel, a wad of material of the same weight was fired out of the other. The gun was a rather clumsy affair, the barrel having to be inconveniently long, and so far as we remember no practical use was made of the Davis gun in aircraft.

In this country we can claim to have been in the field comparatively early. A British flying boat, the Blackburn Perth, built in 1933, had in the bows a Vickers quick-firing gun which fired 1½ lb. shells at the rate of 100 per minute. The Perth did not go into large-scale

production, and no other aircraft of that period was modified to take this gun.

The evolution since then has been from the 0.303 and 0.5in. machine guns, through the 20 mm. Hispano and, more recently, the 40 mm. Vickers cannon now fitted in so many aircraft. But it is a large jump from 40 mm. to 75 mm., and it would be extremely interesting to learn how our American friends have solved the recoil problem. That a 75 mm. shell can cause great havoc is obvious, even if it is scarcely likely that the aircraft can be held on the target for more than two or three seconds. Already the Mitchell 75s have rendered a very good account of themselves in the Pacific, so it is, perhaps, legitimate to hope that we may see them in action nearer home.

Aeronautical Science School

THE statement by the Minister of Aircraft Production in the House last week that the Aeronautical Research Committee made its report on the suggested University of Aeronautics on August 10th, and that its main recommendations have been "approved in principle," is satisfactory in so far as it indicates that things are beginning to move. The inter-departmental committee recently appointed under the chairmanship of Sir Roy Fedden is now engaged on preparing detailed proposals for a "School of Aeronautical Science."

So far so good. But one is slightly uneasy concerning the title which has, apparently, been chosen officially. The word "school" is scarcely in keeping with what was in the minds of those, *Flight* included, who started the ball rolling by drawing attention to the lamentable inadequacy of our aeronautical training and research, and have consistently advocated improved facilities ever since. It rather suggests that there has been a whittling-down of what had been expected. Whether the blame, if our surmise is correct, should be laid at the door of the Government or at that of the A.R.C. we have, of course, no means of knowing. We may be quite sure that Sir Roy Fedden is not in favour of cheeseparing. He has seen too much of the lavish way in which training and research are treated in the United States of America. But he is obviously limited by the terms of reference of his committee, which called upon him to prepare detailed proposals "within the general framework of the recommendations of the Aeronautical Research Committee." No doubt Sir Roy has been set a limit to the money which may be expended, and obviously he will have to draw up his proposals on that basis.

Aviation has reached another stage in its development. The first was the "stick-and-string" stage, when the main problem was to get aircraft into the air and keep them there for a reasonable time. The next great change came when we changed over to stressed-skin, all-metal construction. That was accompanied by vast increases in speed, due mainly to the increased power which became available. We are now reaching speeds at which, locally at any rate, the speed of sound is approached or even exceeded. This has brought a number of fresh problems, structural as well as aerodynamic, and if this country is to maintain a leading position in flying, these problems will have to be solved. For that the very best training and the most advanced research methods will be needed.

In addition to what may, perhaps, be termed the normal step-by-step development there is the radical change in technique represented by jet propulsion. Here we have a fresh field to conquer, and it is not unreasonable to suppose that had our technical training been better and our research facilities on a more generous basis, jet-propelled types of aircraft might have been in operation on a considerable scale by now. There will be general sympathy with the plea of Mr. Oliver Simmonds, M.P., "that this will be a real practical school of aeronautical engineering and not an academic hothouse."

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A LITTLE FLAP: A Martlet fighter takes off from H.M.S. *Furious* to intercept enemy aircraft. The flaps are lowered about 30 degrees to assist take-off. The other ships are the battleship H.M.S. *Duke of York* and the cruiser H.M.S. *Glasgow*.

WAR in the AIR

A pointed wing Spit IX being serviced in a farmyard at an advanced landing ground in Italy.

Bomber Command's Mighty Offensive : Germans Said to be Seeking Papal Help to Gain Respite : American Daylight Attacks on Solingen

APART from the week's current activity in the air war, there have been two items of news which are worthy of comment.

First there was the Air Minister's statement in the House in which he gave the total losses sustained by the R.A.F. and the U.S.A.A.F. in their night and day operations over the European "fortress," and, almost simultaneously, the revelation that Von Papen's unexpected visit to the Pope was to try and persuade His Holiness to sponsor an appeal for a bombing armistice.

From January 1st until 6 a.m. on November 30th, said Sir Archibald Sinclair, the number of British bombers operating from this country which had been lost over Europe was 2,189, made up of 2,083 which failed to return from night operations and 106 lost on daytime missions. During the same period the U.S. Eighth Army Air Force lost 829 bombers in daylight operations

Another telling figure given by the Air Minister was that during this 11-month period, Bomber Command of the R.A.F. had dropped more than 127,500 tons of bombs on Germany and enemy targets in Occupied Europe in the course of 182 night operations. The greater portion of this enormous tonnage was dropped on fewer than half those nights in the big raids on Germany itself. The balance was "delivered" during medium and small-scale attacks.

The figures are eloquent evidence of the extent to which our bomber offensive has been stepped up during the present year, especially when it is remembered that in November, with all its inevitable bad weather, more than 13,000 tons were dropped on Germany alone.

It is not altogether surprising, therefore, that Hitler should have interrupted Von Papen's journey back to his post as German Ambassador to Turkey, turning him aside when he reached Budapest and sending him to Rome.

According to reports, the idea came from Ribbentrop, but it is doubtful if any of the Nazi leaders really entertained any genuine hopes of getting the R.A.F. "called off." If the Pope did sponsor such an appeal and it had

FOR THE LONG TAKE-OFF: Marauders taxying round the airfield perimeter track to the take-off point. The Martin Marauder has the heaviest wing loading of any military aircraft in service to-day.

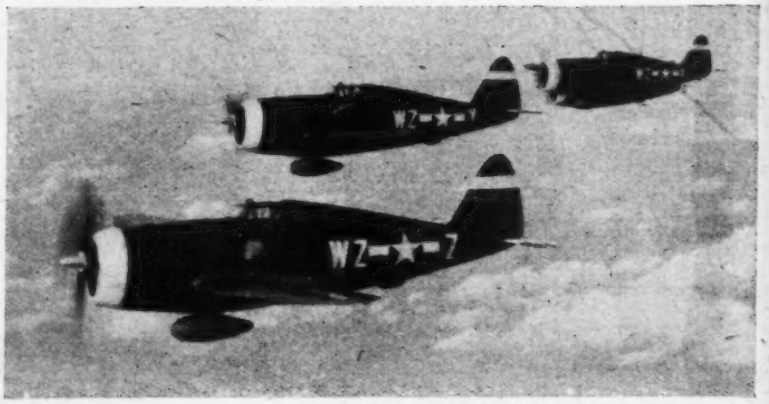
WAR IN THE AIR

the desired effect, Germany would have a respite in which she could restore both shaken morale and shattered war factories. But what is more probable is that the Germans intended to make use of the Allies' expected refusal and advertise it, through Goebbels' propaganda machine, as proof that our sole ambition was to destroy the German people, and thus convince them that there was no alternative but a fight to the finish in self-defence.

It is also reported that the proposal for a bombing armistice via the Vatican was meant to take the form of a last warning from Hitler to the British people that unless we forced our leaders to agree to it, he would be obliged to give the word for terrible reprisals with new secret weapons, the effect of which would be so devastating that, as a humanitarian, he wanted to give even his enemies a final chance of avoiding an indescribable fate.

As we have said before, claims for humanitarian motives on the part of Hitler and his colleagues come a little late in the day. A much more reasonable explanation of this sudden kindliness towards Britain is that, even if he has some new weapon as yet untried, the fact that he is prepared to trade it against our heavy bombers shows that he knows it cannot turn his looming defeat into victory.

Diplomatic circles are said to doubt very much if an experienced statesman like the Pope would lend himself to any such German manœuvre, though it is reported that the Pope has hopes of arranging a twenty-four hour armistice on Christmas Day, which is entirely another matter.



LONG-RANGE FIGHTERS: Part of a formation of U.S.A.A.F. Thunderbolts in echelon to starboard. They are carrying drop-tanks and are painted in the characteristic Thunderbolt markings.

In the meantime the air offensive against Germany goes on, and on November 30th and December 1st American Flying Fortresses and Liberators, supported by U.S.A.A.F., R.A.F., Dominion and Allied fighters attacked targets in Western Germany with Solingen as the chief objective on both occasions.

Simultaneous Assaults

THE first of these raids was carried out by the "Forts" escorted over the target by long-range Thunderbolts and Lightnings, while Spitfires and Typhoons covered the latter stage of the withdrawal and shot down half a dozen enemy aircraft in the process. Two Fortresses and five fighters were lost in this operation. The second attack on Solingen was carried out by combined squadrons of Fortresses and Liberators, simultaneously with attacks by U.S. Marauders on enemy airfields near Cambrai, an attack by R.A.F. Mitchells on a German aircraft factory at Albert, and Mosquito attacks on industrial targets in Holland. Once again, Thunderbolts and Lightnings escorted the American heavy bombers with Spitfires and Typhoons in support, the Marauders were supported by Spitfires and Typhoons, and the Mitchells had Typhoon escorts. The Mosquitoes which went to Holland looked after themselves (as "Mossies" are so capable of doing), while other Mosquitoes, accompanied by Typhoons, went for enemy shipping off the Brest peninsula.

One effect of all this intense activity was a series of great daylight air battles over Germany and Occupied Territory in which a total of 33 German aircraft were destroyed. Allied losses in these and other subsidiary attacks by R.A.F. and U.S. bombers amounted to 27 heavy bombers, one light bomber and 14 fighters.

Bad weather had the effect of limiting air activity in the Mediterranean area last week, but, nevertheless, a feature of the Eighth Army's successfully launched offensive on the Italian front was the most effective air support which gained special commendation. Additionally the usual routine patrols were maintained, and enemy shipping in the Aegean Sea attacked. There was also an example of enemy air activity which has become increasingly rare of late, namely, an attempt by a formation of enemy bombers to attack one of our convoys in the Eastern Mediterranean. In the simply worded message from Middle East headquarters of the R.A.F.: "The enemy formation was broken up by our fighters and two Ju 88s were destroyed."

During the same period, heavy bombers of the North-West African Air Forces attacked enemy targets north of Trieste, while large forces of medium and light bombers, fighter-bombers and fighters went for targets in the ground battle area, transports and other military targets north of

KEEP 'EM FLYING: R.A.A.F. ground crews swarming over a Bristol Beaufighter at an airfield in N.W. Australia.

ENEMY AIR LOSSES TO DEC. 4th

	Over G.B.	Continent	Middle East	N.W. Africa
Nov. 28	0	0	0	0
,, 29	0	5	2	0
,, 30	0	6	0	5
Dec. 1	0	10	0	3
,, 2	1	3	0	17
,, 3	0	4	0	11
,, 4	0	11	1	6
	1	39	3	42

Totals: West, 7,778; Middle East, over 5,755; North-West Africa, 3,712.

BRITISH & U.S. AIR LOSSES TO DEC. 4th

	Over G.B. A'crft.	Continent B'brs.	Continent F'trs.	Middle East A'crft.	N.W. Africa A'crft.
Nov. 28	0	0	0	0	0
29	0	13	18	2	3
30	0	2	5	0	3
Dec. 1	0	28	16	0	0
2	0	41	0	0	8
3	0	24	1	0	1
4	0	1	1	1	0
	0	109	41	3	15

Totals: West, 8,680; Middle East about 2,338; North-West Africa, 1,383.

Rome, and enemy airfields. The official communiqué states that "very accurate concentrations were obtained."

Another useful outing by the North-West African Air Forces last week was the attack on the submarine pens and construction works in Marseilles harbour. This was carried out by a strong force of Fortresses and was the first time this particular target had been visited. It was due for attention, however, because the submarine facilities, which had been under construction for some time, were nearing completion. Considerable damage had also been done a few days previously to the Germans' naval installations at Toulon, especially the dry docks.

A Skilful Feint

BOMBER COMMAND has grown very skilful in ringing the changes in its attacks on German production centres, and it has particularly good chances of puzzling the defences now that the Germans rely mainly on fighters, and are very short of that class of aircraft. The enemy naturally wants to concentrate his fighters over the "target for to-night," while the staff of Bomber Command delights to keep him guessing.

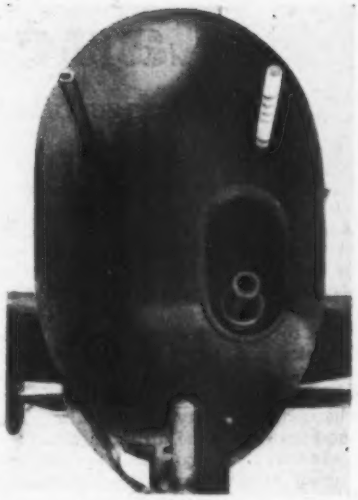
On the night of Friday, November 26th, a large force of Lancasters and Halifaxes, with a contingent of Mosquitoes hanging about warily in the background, set out ostensibly for Berlin. When only a few miles short of the German capital the Lancasters and Halifaxes turned sharply away to the south and made for Leipzig, while the Mosquitoes carried on to Berlin. The German fighters were completely foxed,, and lost the main body of bombers. The people of Berlin must have been agreeably surprised to get only a comparatively light raid instead of a "saturation" effort. Leipzig, on the other hand, was caught unprepared, with hardly any fighters in the sky to protect it. The guns and searchlights did what they could, but it was only at the end of the raid that the fighters received news of what had happened, and made off to Leipzig. Most of them arrived too late to affect the result of the raid.

Germany's last hope, the U-boat, has met with a very nasty knock in the Atlantic, and the blow was delivered from the air. Three convoys were at sea, when packs of U-boats were observed lying in wait for them Machines of the U.S. Navy worked heart and soul with those of Coastal Command, and, of course, the Royal Canadian Air Force played its part. Liberators, Sunderlands, Hudsons and Venturas all shared in the victory—for victory it was of a complete character. The fighting went on for eight days, and evidently the U-boats sometimes followed their new tactics of remaining on the surface and fighting it out with the aircraft. One Liberator was lost, and its captain was a son of Air Chief Marshal Sir Arthur Longmore.

The Allied aircraft attacked 15 U-boats during the eight days, and six are known definitely to have been destroyed. But the air attack was so successful that not one merchant ship in the convoys was attacked, and finally the enemy gave up the contest and sheered off. Most of the crews in the U-boats must now be young and inexperienced sailors, and this defeat cannot but have a most demoralising effect on the whole of the German Navy.

The Japanese have had the impertinence to make a daylight air raid on Calcutta. They sent in two waves of bombers escorted by fighters. Our fighters intercepted, and some of the enemy were destroyed. There were some casualties among the civilians in the crowded city.

LINE SHOOTING: Marauders of the American 12th Air Support Command score a direct hit on the railway bridge at Fano on the Italian east coast.



AERIAL ARTILLERY: The new nose of the Mitchell (B25) with its two .5in. machine guns and a 75mm. cannon.

A.T.C. CALLING!

AN exhibition of A.T.C. training devices, equipment and photographs, together with R.A.F. pictures, will be opened at Harrod's, Knightsbridge, next Wednesday, 15th inst., by the Secretary of State for Air.

Features of the exhibition include the Link Trainer, a Synchrophone, a Kirby cadet glider, a Lancaster fuselage, and models made by A.T.C. cadets.

Lancaster I and II

Interchangeability of Power Eggs Applied to One of Our Four-engined Bomber Types

ALTHOUGH we have somewhat of a reputation for muddling through, and also of having a flair for improvisation, it is refreshing to find a specific instance in which forethought and careful design have gone hand in hand. Actually, of course, the British are masters of the art of long-term thinking, and the suggestion that we live in a state of perpetual "flap" is an unmerited libel.

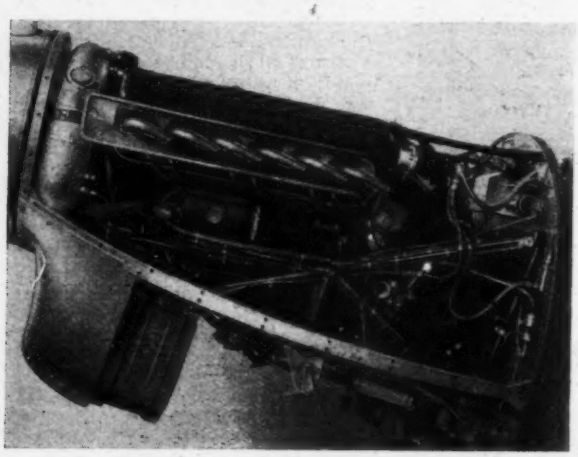
In 1938, when war appeared to be inevitable, the Air Ministry and the S.B.A.C. got together to thrash out a scheme whereby all the power units of roughly the same horse-power, air or liquid cooled, could be made interchangeable on any type of aircraft with the minimum of modification to the airframe structures.

As was to be expected, the power egg resulted, and the engine manufacturers became responsible for everything forward of the engine bulkheads. On the airframe manufacturers' side the bulkheads were likewise standardised in that connections for pipes, electrical couplings, pneumatic and hydraulic controls, etc., followed a common pattern.

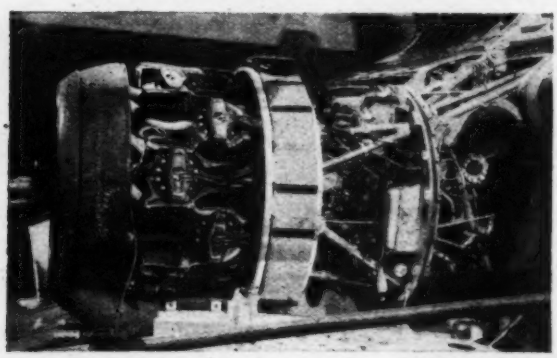
For many years previous to this the engine makers had toyed with the idea of the complete and interchangeable power unit, but this was mostly with the aim in view of saving time in changing engines for overhaul. The Bristol company, for instance, fitted such a unit to their ten-seater as early as 1922, and this had the added refinement of a hinge forward of the bulkhead for access to the accessories.

Up to a comparatively few years ago, engines and their components sprawled all over the place and were open to the breeze. They formed no small percentage of what was then facetiously termed "the built-in head wind." Cooling looked after itself and the leading of air through special ducts did not enter into the scheme of things. Nowadays, when at least three times the amount of horse-power has to be crowded into each cubic foot of engine space, cooling and airflow have become such a tremendous problem that it is economical only for the research departments of the engine makers to tackle it.

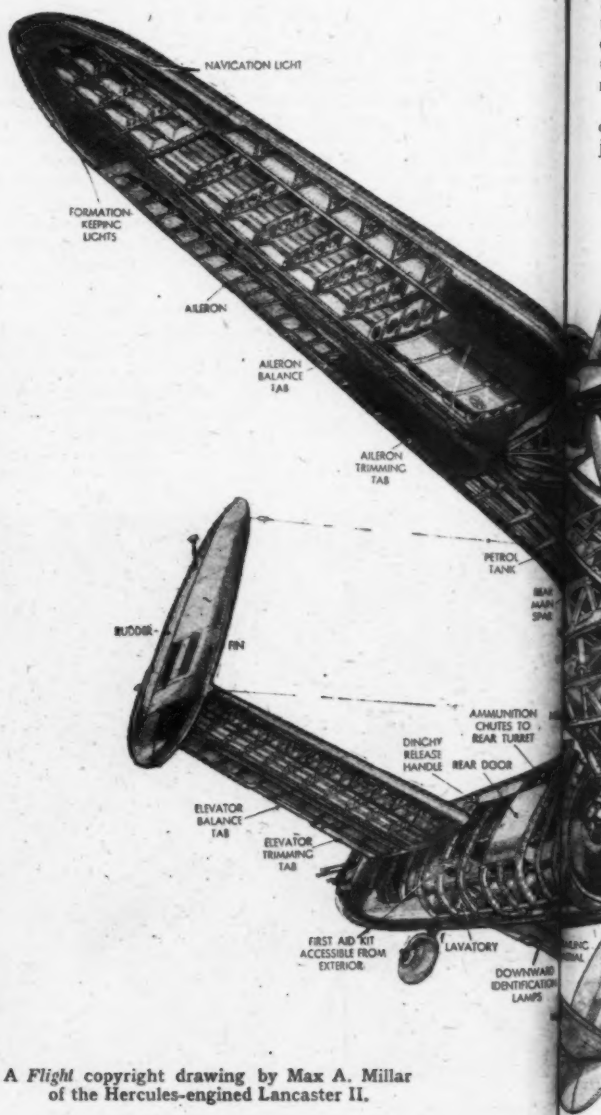
Digressing for a moment, it is this terrific density of



IN LINE: The Rolls-Royce Merlin XX power unit as fitted to the Lancaster I.



RADIAL: Fitting a Bristol Hercules XVI to the inner port engine mounting of a Lancaster II.



A *Flight* copyright drawing by Max A. Millar of the Hercules-engined Lancaster II.

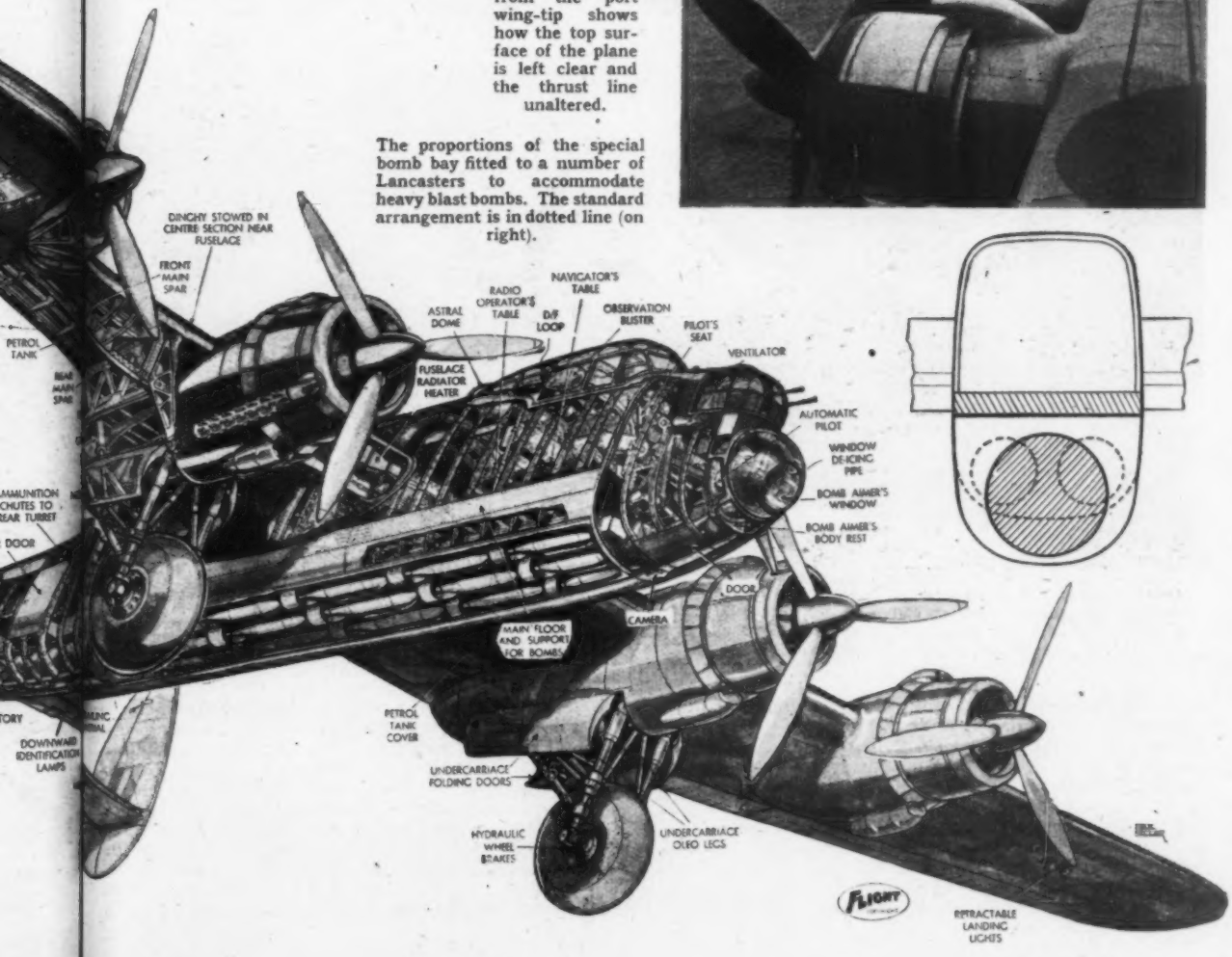
The Lancaster I has de Havilland constant-speed airscrews fitted to the Merlin engines.

horse-power and its excessively close cowling which is responsible for so many burn-ups in crashes. The sudden cessation of conducted cooling air in a crash leaves so much undissipated heat that fire is frequently the result. Oil, not petrol, is often the first to ignite.

Returning once again to the standard power egg, it is obvious that the scheme has many advantages other than just efficiency as a unit. Since all the bearers and cowling

An unusual view from the port wing-tip shows how the top surface of the plane is left clear and the thrust line unaltered.

The proportions of the special bomb bay fitted to a number of Lancasters to accommodate heavy blast bombs. The standard arrangement is in dotted line (on right).



LANCASTER I AND II

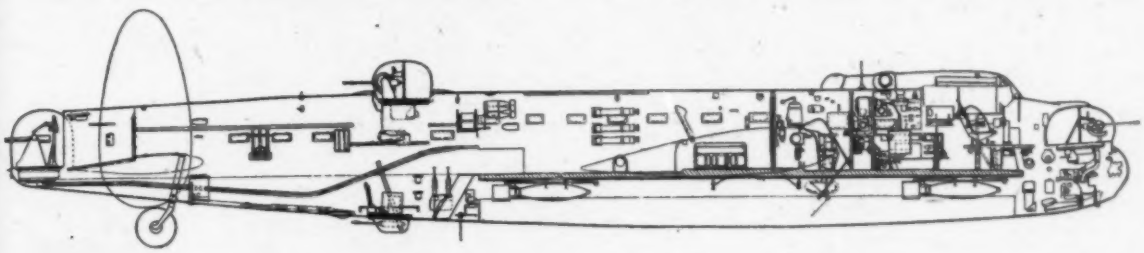
Nose and starboard engines of the Lancaster I. Flame-damping muffs are fitted over the exhaust stubs of the Merlins.

On the Lancaster II exhaust flame-damping is achieved by a special design of exhaust pipe to cool the hot gases quickly.

are built under the control of the few engine manufacturers and not as an assortment of designs by multitudinous airframe makers, a great saving of time results. A further saving in time occurs in the design of prototype aircraft. If the Air Ministry specify a Merlin or a Hercules or a Sabre engine to be fitted, the range in design of the power unit is immediately known to the airframe designer. An even greater advantage in wartime is the manner in which engine production can be used to its maximum advantage. If, for instance, the whole of the liquid-cooled engine production was smashed by enemy action, our bombers would still be over Germany but they would have air-cooled radials instead. If production of one type is above expectation and output of another is below schedule, then adjustment can be made to employ all the available engines economically. Yet other advantages are found in cases where specific operations call for special performances, such as high take-off power or power at some particular altitude. The most appropriate engine can be easily fitted to the requisite number of aircraft.

In the case of the Lancaster I being changed to the Lancaster II by fitting Bristol Hercules XVI in place of

LANCASTER I AND II

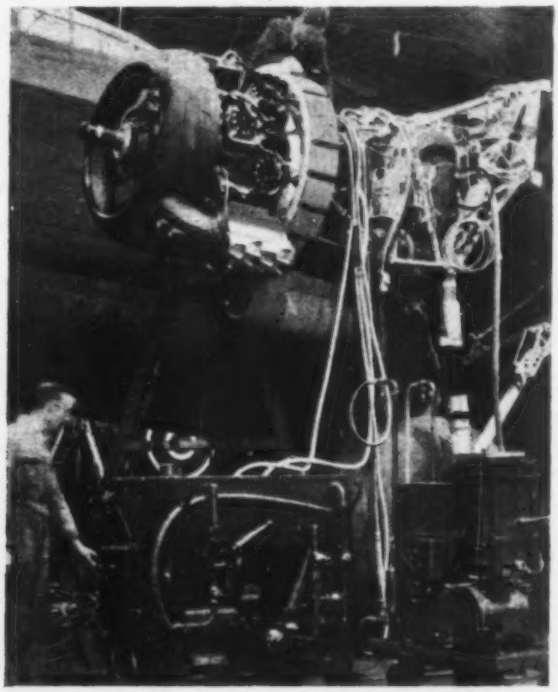


Side elevation of the Avro Lancaster showing how the bomb load is supported by a beam built into the structure.

MERLIN XX.	
Bore	5.4in.
Stroke	6in.
Capacity	27 litres
Compression ratio	6 : 1
Gear ratio	0.42 : 1
Take-off power	1,280 h.p. at 3,000 r.p.m.
Dry weight	1,450 lb.

HERCULES XVI.	
Bore	5.75in.
Stroke	6.5in.
Capacity	38.7 litres
Overall diameter	52in.
Gear ratio	0.44 : 1
Take-off power	1,635 h.p.
Nett weight	1,890 lb.

Even the standard bomb bay of the Lancaster is capacious.



Checking the hydraulic pump of the port inboard Hercules by means of a test rig. The undercarriage leg is just beginning to retract.

Rolls-Royce Merlin XX, the only structural alteration was in the design of the engine mounting. This was necessary to prevent alteration of the C.G. position. As will be seen from some of the photographs, the thrust line remains unaltered and the unbroken contour of the top surface of the main plane (which Mr. Chadwick, the designer, considers so essential) is preserved. The increased horse-power —the Hercules XVI is 1,635 h.p., compared with the 1,260 h.p. of the Merlin XX— as, of course, resulted in better take-off and climb to rated altitude.

Lancaster II is a neat aircraft from the head-on aspect.

HERE AND THERE

Vacancy for Junior Artist

A VACANCY exists in the 'artists' department of *Flight* for a junior possessing drawing-office or art-school experience. Applications, stating age and training, should be made to the Managing Editor

For Your Diary

DR. H. ROXBEE COX is to preside at the next meeting in the winter programme of the Graduate and Student Section of the R.Ae.S., on December 15th, when there will be a discussion on the training of the aeronautical engineer.

New H.Q. for Civil Aviation

THE administrative branches of the Department of Civil Aviation, until recently located at Bristol, are now installed in Parliament Square House, Whitehall, and Mr. W. P. Hildred, C.B., O.B.E., the Director-General of Civil Aviation, and his staff have also moved to new quarters at this address, from the King Charles Street offices of the Air Ministry.

A Bigger Lancaster

ON returning to Canada in October after an intensive tour of this country, the Director-General of Aircraft Production (Ralph P. Bell) in Ottawa forecast a 20 per cent. bigger Lancaster for 1945.

He is reported in the *Toronto Globe* as saying, "You know, or you ought to know, that the big thing about the Lancaster is that its ratio of loss is less than any other big four-motor bomber in the world. Think what that means in superiority and what it means to an aircrew."

Fairey's New Chairman

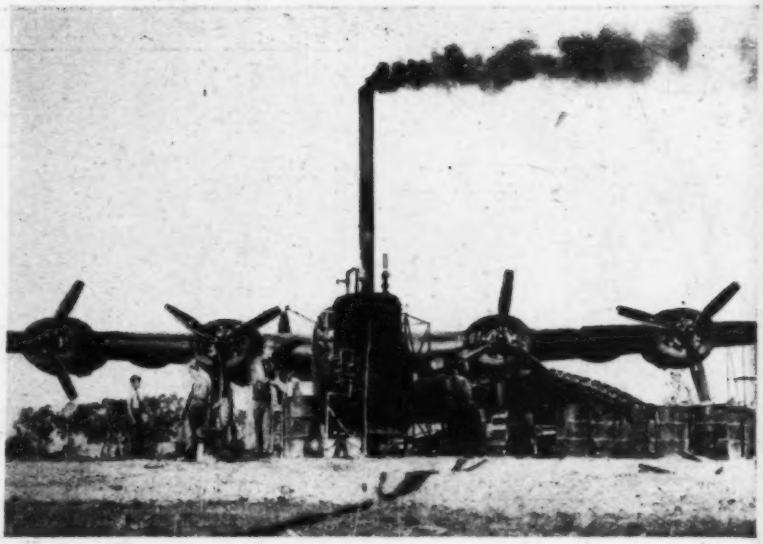
SIR CLIVE BAILLIEU, who has recently returned to London from Washington, has, at the request of Sir Stafford Cripps, Minister of Aircraft Production, accepted an invitation from the board of the Fairey Aviation Co. to act as chairman of the company during the absence abroad of Sir Richard Fairey.

A year ago Sir Stafford Cripps appointed Mr. G. E. Marden joint managing director of Fairey's, and he remains in that position.

Another U.S. Record

AMERICA'S warplane production set up another record in November by topping the 9,000 mark, it has been reported. This is equal to a rate of one complete aircraft every 4 min. 48 sec.

This total is also said to include a "substantial increase" in the proportion of heavy bombers, including the new B-29 "Super Flying Fortress," which is said to be able to carry a 10-ton bomb load farther than any other bomber now in service.



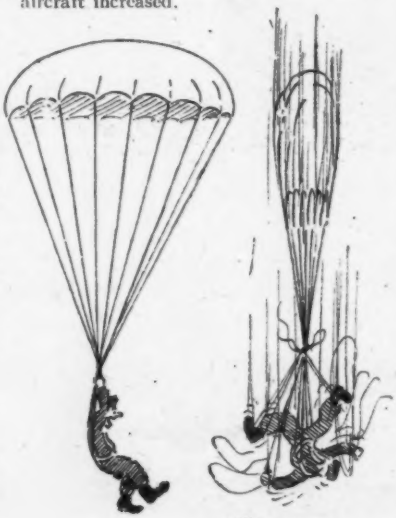
STEAM LAUNDRY: No, this is not a Liberator fitted with the boiler and smoke stack from Stephenson's "Rocket," but a perfectly normal "Lib" undergoing a steam-cleaning process used at an Australian station. The new nose turret can just be glimpsed to the left of the "laundry" boiler.

Return Tickets to New York

IT will be possible, within a few months of the end of the war, to book a return on a luxury airliner to New York for £50, according to Group Capt. D. F. McIntyre, D.F.C., who expressed this opinion when he recently addressed Canadian servicemen at Glasgow University.

"That figure," he added, "could be halved when the infinitely more economical short-hop routes via Iceland and Greenland are used."

These costs were based on small present-day aircraft, and would be rapidly reduced as the size of commercial aircraft increased.



"Now now, temper temper!"

What's in a Name?

THE New York city council is annoyed. In a recent request Mayor LaGuardia asked the council for another one-and-a-half million dollars for the acquisition of more land for the "municipal airport at Idlewild." The request was referred to the finance committee. One councillor (or, as the Americans have it, councilman) said it was an affront to ask for funds for the New York airport under that name. (The name apparently is LaGuardia's suggestion. The city fathers, it seems, had chosen the much more snappy title, "The Maj. Gen. Alexander E. Anderson Airport.")

Trading with the Enemy?

THE Spanish airline, Iberia, which recently resumed activity, and which was under German control, has now been taken over by the Allies; "Anglo-Americans," says one report, "have bought out the German interests."

The line had to stop operating last July when the Allies stopped its fuel supply, and the first resumption of its activities was the reopening of the Lisbon-Madrid service, recorded in these columns in *Flight* of November 25th.

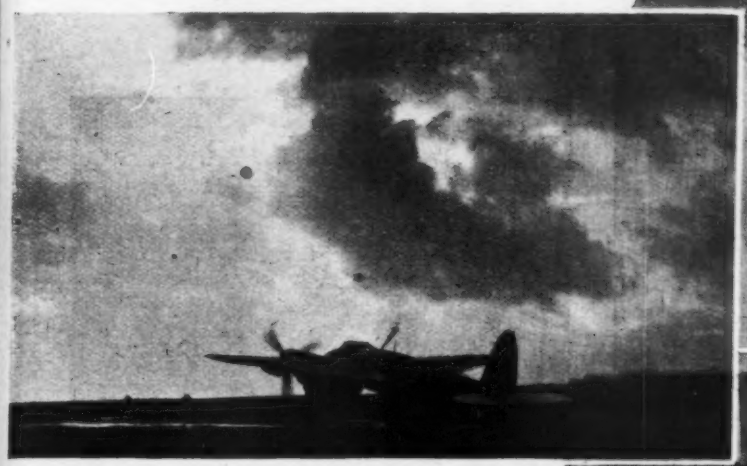
The route between Spain and Africa has now been resumed, but enemy citizens who may wish to travel by it will have to get British permits.

Trans-atlantic Air Mail Service

SINCE from time to time difficulty is experienced, particularly during the winter, in arranging for conveyance by air across the Atlantic of air mails for Canada, the U.S.A. and beyond, the Postmaster-General states that in the general interest the transatlantic air mail service should be used for only the most urgent correspondence.

The airgraph service is available to members of the Forces in Canada, Newfoundland and the U.S.A., and to civilians in Canada and Newfoundland, and the fullest use should be made of this service.

Mosquito Squadron



(Above) In the gathering twilight a Mosquito taxies out to the take-off point.

Silhouetted against a darkening sky a Mosquito heads for the Continent.

(Above) A quiet game of cards in the crew room.

Intruder crews plotting the night's courses. The instruments on the table are bubble sextants.

Exclusive Pictures of Intruders who Fly Britain's Slickest Fighter-Bomber

ALTHOUGH the medium, heavy and fighter bombers pay full attention to enemy airfields by day, the night intruders still have an extremely important job of work to do. There is nothing so disturbing to morale as the feeling that one's base is not safe from enemy attentions. Apprehension of a bomb

The operational crews for the night being chalked up on the board.

The last man home outlined against the dimly lighted eastern sky.

MOSQUITO SQUADRO

(1) About to climb the ladder into the cockpit is Sqn. Ldr. Beveridge who has made 28 raids into enemy territory and destroyed two enemy aircraft. With him is his navigator, Sgt. B. Bays.

or cannon attack during a take-off or landings, when the aircraft is helpless, has been the cause of many crashes apart from those cases where an actual attack has been made. Many times our highly trained crews draw blanks on the airfields in their sector, and then they must be satisfied with a little railway engine busting or perhaps the shooting up of power and transformer stations. Each of these Mosquito intruders carries a crew of two, and each photograph of a crew also shows some portion of the aircraft in detail, making these three pages most informative.

The Mosquito, it will be remembered, is produced as a fighter, fighter-bomber, intruder, bomber, photographic reconnaissance aircraft, and also as a civil transport. The transport version, of course, being for very special wartime air services.

(2) On the left is Flt. Sgt. H. Williams who has intruded on twelve occasions, and leaning on the wheel is Flt. Sgt. R. Gurnett.

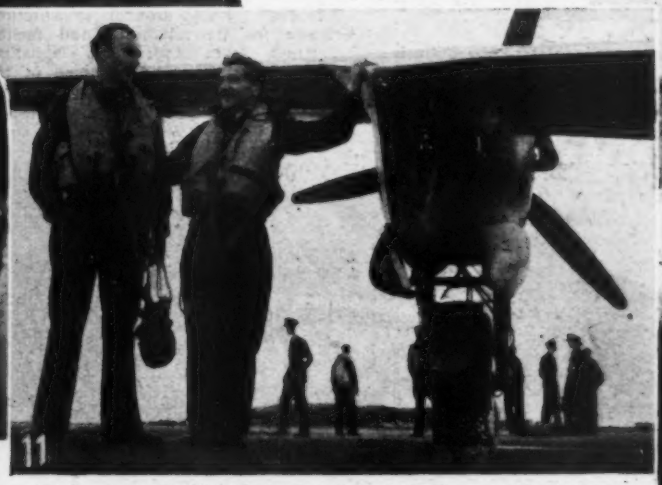
(8) In the Operations Room. On the telephone is Sqn. Ldr. D. C. S. Macdonald. (9) Apparently fondling the port airscrew is Flt. Lt. J. E. Palmer, wearing the ribbon of the D.F.C. he won in Malta, with P/O. G. Morris, an Intelligence Officer.

(10) A glimpse of Sqn. D. C. S. Macdonald, of Vance seen through the open co door. The leading edge ra can just be seen in the to of the photograph.

(3) Leaning against the tailplane leading edge and watching another Mosquito in the air are F/O. J. D. Armstrong (left) and his navigator F/O. A. J. Brown. Both are Canadians and both have five successful missions to their credit.

(4) Another Canadian team. (Left) F/O. T. Thompson, of Vancouver—pilot. (Right) F/O. D. H. S. Schellenburg, of Winnipeg—navigator. (5) With the port drop tank and the exhaust muff as a background are F/O. R. H. Lee (left) and his navigator, Flt. Sgt. E. R. Collier.

(6) Dwarfed by the close view of the starboard wheel are Sgt. A. W. Gray and F/O. H. A. Hoar who both have 26 operational flights to their credit.
(7) Wing Cdr. P. Y. Davour, D.F.C. and F/O. J. K. Reynolds, his navigator.



(11) Conveniently situated so as not to obstruct an excellent view of the port leg and engine nacelle are Flt. Sgt. E. W. Noal and P/O. J. T. Caine who fly the aircraft.
(12) Worth their weight in gold. A ground crew busily preparing a De Havilland Mosquito for the night's work.

Behind the Lines

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries

No Contact

NO air mail from Hungary has arrived in Stockholm for some time, reports the Hungarian Telegraph Service from Stockholm. Air traffic with Germany is also reported to have been impeded recently.

From Rumania

THE Rumanian Secretary of State for Air has been empowered to increase the so-called Autonomous Administrative Fund by 800,000,000 Lei to 1,585,000,000 Lei. This allocation will be mainly spent on the purchase of new aircraft and material for the Rumanian aircraft industry.

What They Say

NEW measures of rationalisation, improved dovetailing of design, and more efficient methods of manufacture, says a German report, are responsible for an increased efficiency in mass production of aircraft. According to the report, the introduction of these measures will produce a saving of 13.6 million man-hours per month.

Secret Information

THE Swiss *Journal de Geneve* professes to know details of some new German secret weapons. It says that "they are rocket shells with a range of 200 km. (124 miles) and weigh from 2 to 20 tons. The average type weighs 12 tons and is 12 m. (39.3ft.) in length.

"Trials with the smaller sizes were satisfactory," it adds, "but the larger types were much less so."

Continental Rubber

SYNTHETIC rubber production is to start in Rumania to cover her requirements of 2,000 tons per annum. The process developed at the Petrolina refinery will be used.

For some time now the Rumanian Government has experimented with Kok-saghyr, originally planted by the Russians in Bessarabia.

"These experiments," says a recent Rumanian report, "are very satisfactory, but no method has yet been developed to prevent a considerable variation in yields obtained."

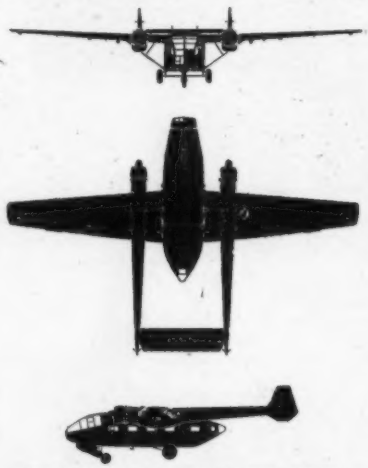
To make Kok-saghyr pay, it is asserted that a minimum yield of about 100 lb. per acre is necessary, but such uniformity has not been obtained.

Repeat Order

THE German Air Force has, since January last, doubled its fighter strength, says Jean-Herold Paquis, the military commentator of the Paris radio.

"The *Luftwaffe* has recently put into service three new types of aircraft, of which two are fighter-bombers, whose speed reaches 700 km. per hour (434 m.p.h.). The third is a giant machine capable of transporting lorries or a tank, guns, or 130 men with equipment." It will be recalled that the maximum speed of the Ju 188 is 325 m.p.h. at 20,000ft.

Repeating the current German threats of reprisals, Paquis says that "war will not be total until German squadrons fly to England, because England, like Carthage, must be destroyed."



The Gotha 244 is powered alternatively with two French-built Gnome-Rhone 14-cylinder radials of 700 h.p. each, or the 14N of a max. output of 950 h.p. each.

Exodus

A NEUTRAL source reports that large cities in Southern France and in Rumania are being evacuated. The reports add that Bucharest, Ploesti, and Constanza are said to have already been evacuated.

Jap Production

THE necessity for further increase in armament production was emphasised in a speech delivered by the Japanese Minister of Armaments to the leading officials of his Ministry.

"In view of the desperate Anglo-U.S. counter-attacks against Japan's outposts in the Southern and Western Pacific," said the Japanese Minister, "Japan must do everything to increase considerably her production of aircraft."

Decorated

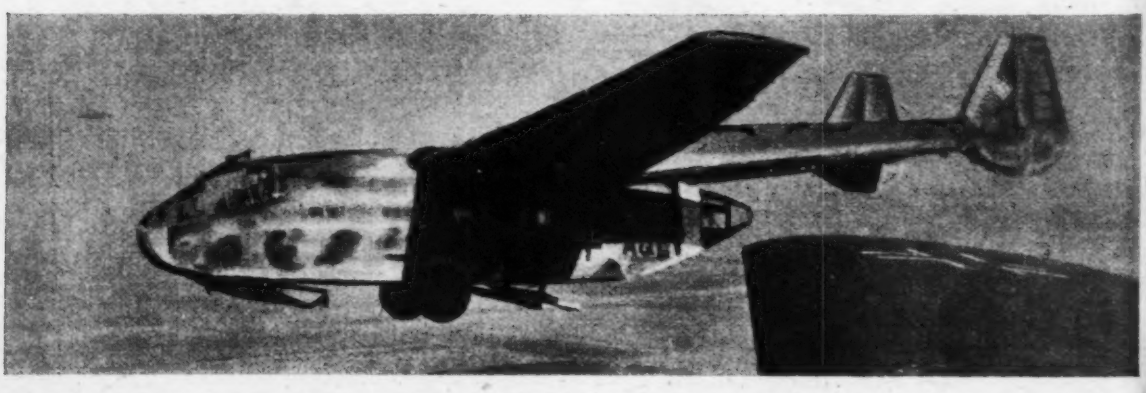
THE Fuehrer has decorated *General der Flieger* Knehl with the Knights Insignia with Swords of the War Merit Cross.

General Knehl was the first Inspector General of the *Luftwaffe*, in which capacity he was closely connected with its reorganisation. In February, 1939, he was promoted to his present rank and appointed Chief of the Training Command.

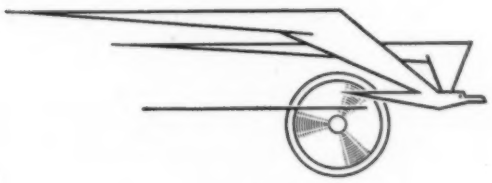
Fluko

THE nerve centre of the German Air Defence is the *Fluko* (*Flugwacht Kommando*), which is responsible for both the night fighter and ground defences. Its personnel is carefully chosen for its reliability and mental alertness from *Luftwaffe's* signalling units, in addition to members of the *Luftwaffe's* women's auxiliary service.

"They must have iron nerves"—says the German radio.



The Gotha 242 twin-boom glider in all-wood construction has a span of 79ft., length of 52ft. 6in., and a height of 11ft. 8in., with an empty weight of 3,200lb. The Gotha carries 5,300lb. of freight and is usually towed by Ju 52/3m.



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Aircraft Types an

CURTISS AT-9 ("JEEP")

As a twin-engined advanced training aircraft, the Curtiss "Jeep," whose official designation in the U.S.A.A.F. is the AT-9, is somewhat smaller than the conventional British idea of a machine in this category, taking the Airspeed Oxford as the obvious example, but its performance is approximately the same, and provision is made for pilot and aircrew training.

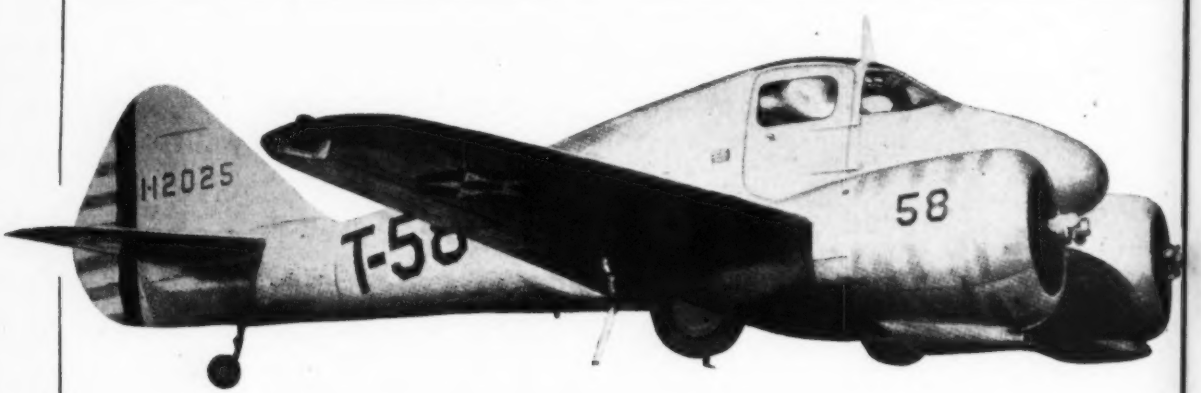
The enclosed cabin accommodates two persons side by side in the front seats, and there is provision for two additional seats immediately behind, access being gained by comparatively wide car-type doors on each side of the fuselage. As on most advanced trainers, the equipment can be varied according to the nature of the training.

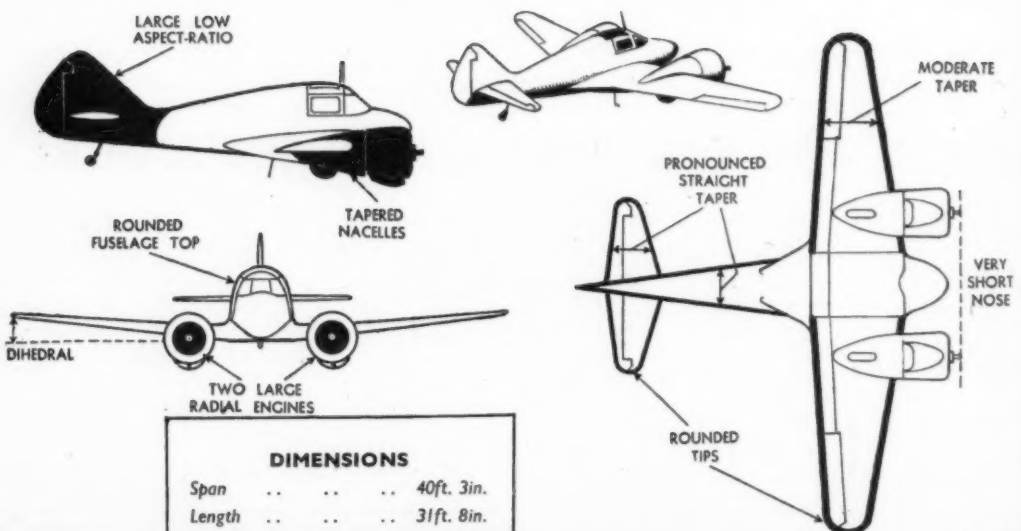
Powered by a pair of 280 h.p. Lycoming R-680 nine-cylinder air-cooled radial engines, fitted with Hamilton-Standard two-bladed constant-speed airscrews, the top speed of the Curtiss "Jeep" is a level 200 m.p.h, its cruising speed is 175 m.p.h., cruising range 750 miles, and it lands at 65 m.p.h., using its hydraulically operated split trailing-edge flaps.

Constructionally, the AT-9 is an all-metal job with flush-riveted alloy stressed-skin covering, and the design is unusual in that the engine mountings and retractable undercarriage are attached to the outer panels instead of to the centre-section. These outer wing panels are a two-spar, neo-geodetic structure.

The fuselage, approximately oval in section, is built up of sheet metal rings and extruded angle skin stiffeners, and the short nose is detachable in one piece forward of the wind shield in order to facilitate servicing.

Recognition does not present any difficulty, as the "Jeep" is quite distinctive in appearance if not particularly beautiful by accepted standards. Its wings are sharply backswept on the leading edge and have a slight taper on the trailing edge with very large fillets at the roots. The tips are rounded, as are those of the tapered tailplane, and the nose of the "tear drop" fuselage is extremely short and overshadowed by the relatively large diameter of the engine cowlings which project well ahead of the leading edge but taper abruptly up to the underside of the wings. Fin and rudder are very large, having a long inclined leading-edge and rounded apex and trailing edge.





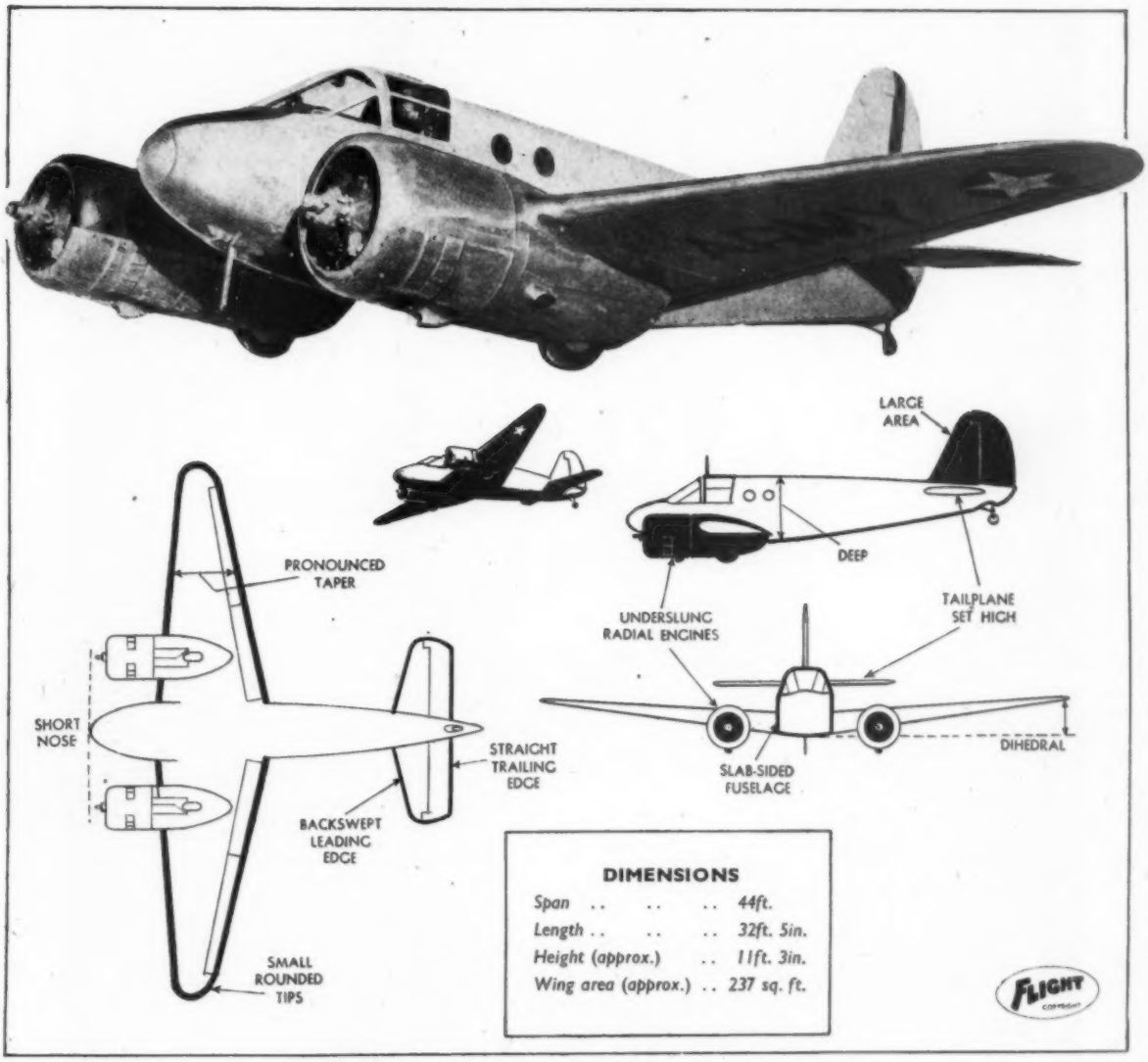
DIMENSIONS

Span	*40ft. 3in.*
Length	*31ft. 8in.*
Height	*9ft. 10in.*
Wing loading	*24.78lb. sq. ft.*

FLIGHT COPYRIGHT

Their Characteristics

BEECHCRAFT AT-10 ("WICHITA")



DIMENSIONS

Span	*44ft.*
Length	*32ft. 5in.*
Height (approx.) ..	*11ft. 3in.*
Wing area (approx.) ..	*237 sq. ft.*

SLIGHTLY larger than the Curtiss "Jeep" but still smaller than the Oxford, the Beechcraft AT-10 "Wichita" is one of a series of Beech trainers in service with the U.S.A.A.F. and is primarily intended for the conversion of pilots from single to twin engines.

With the obvious exception of such things as engine supports and cowlings, undercarriage, and their essential fittings, the only other part of the AT-10 which is not of wood is the pilot's compartment. A particularly interesting innovation is that even the petrol tanks are made of wood and are lined with synthetic rubber.

Double-curvature sections are avoided in the design of the various wooden units and no hot-moulding processes are involved in their production. The result is that 85 per cent. of the major sub-assemblies are being made by furniture manufacturers and other wood workers outside the normal aircraft industry. The "Wichita" is, incidentally, the first wooden trainer to be accepted by the U.S. Army, and besides being in extensive use at flying schools in the States, a number of them are in service for advanced training in units of the U.S.A.A.F. in Great Britain.

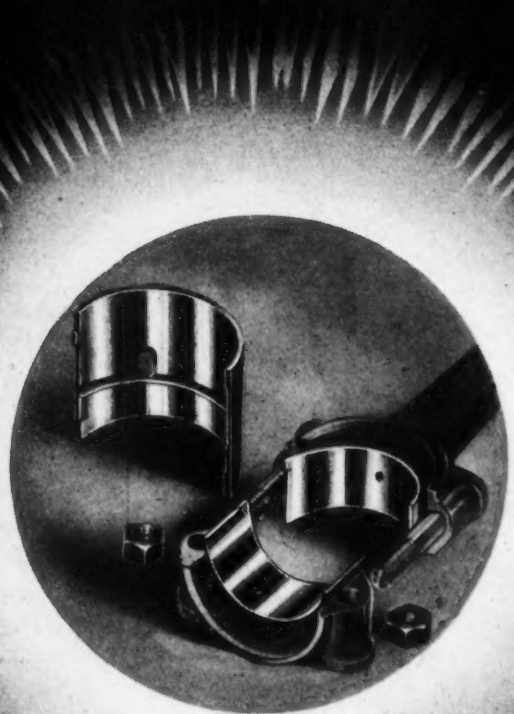
No performance figures for the AT-10 have yet been released, but it is fitted with the same type of Lycoming radial engine that powers the Curtiss "Jeep" and thus its capabilities may be regarded as comparable.

Accommodation is for two pilots (pupil and instructor) seated side by side with dual controls. Complete instrument equipment is provided, including an automatic pilot.

The wooden wings are built in three sections and are plywood covered. The fuselage, almost square in section but slightly rounded at the top, is in two sections consisting of the pilots' compartment which, as already mentioned, is of metal, and the rear section which is of wood and is plywood covered. All bonding is with synthetic resin glue. The tail unit has wood covering to its fixed surfaces but rudder and elevators are fabric covered.

Recognition features include a short nose projecting very slightly beyond the engines, tapered wings with rounded tips, tailplane with tapered leading edge, straight trailing edge and broad round tips, and a large single fin and rudder with straight slope to the leading edge and broad round apex curving into the trailing edge.

An outstanding contribution to modern engine design



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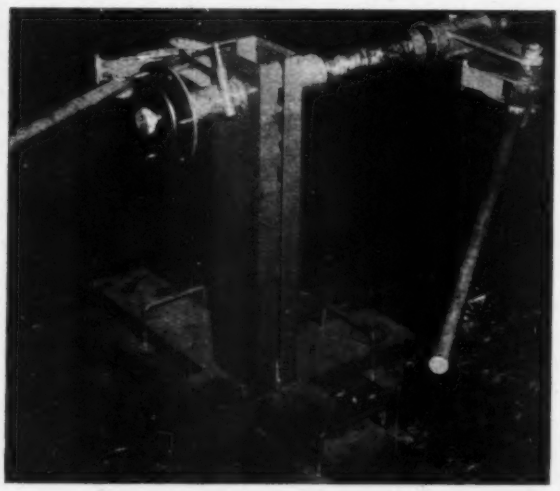
Tyre Changing

Foreman Devises Quick, Easily Used Equipment

CHANGING tyres on the larger types of war cargo planes has been one of the heaviest and time-consuming jobs of the American Airlines maintenance crews. A single wheel on the largest types of aircraft, consisting of tyre and rim, weighs as much as 580 lb., and formerly was changed manually by a crew of six men. Its removal from the aircraft required jacking the machine up to an undesirable and even dangerous angle in order that the men could get a firm grasp on the convex undersurface of the tyre. An even harder task than taking the wheel off was the removal of the tyre from the rim. Heat generated in the tyre during landing and braking causes vulcanising of the bead rubber in the tiny radial grooves which are cut in the rim to hold the tyre against circumferential slipping. Therefore, to release the bead, the tyre side-wall was pounded with heavy sledges which often damaged the costly tyre beyond repair.

Making a complete tyre change on a transport aircraft by these methods required the labour of six-man crews working three consecutive 8-hr. shifts—a total of about 140 man-hours. Now the job is done in an overhaul hangar in less than 1 hr. by two men using equipment devised by Luther Mead, foreman of line maintenance shop and equipment, who has been with American Airlines for thirteen years.



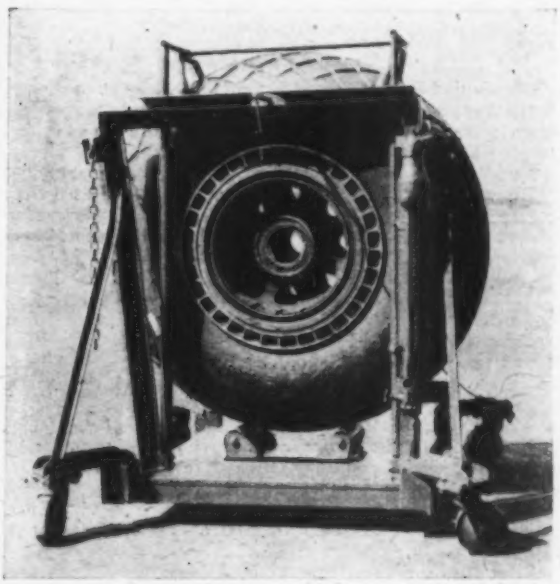
Tyre beads are freed from wheel rim on this simple stand by two men operating the long pivoted levers.

For removing the wheel from the plane, Mr. Mead developed a wheel skate. This is a low platform 30in. square mounted on four 3in.-diameter casters and supporting a braced angle-iron frame on one side for holding the wheel upright. A tubular frame provided with movable hooks at the top (for grasping the tyre) is hinged at the platform to the lower ends of the angle-iron frame, and can be tilted forward and backward by means of a small hand crank at the top of the stationary frame. The wheel is supported from the centre of the platform on a pair of rollers, which can be raised and lowered by means of a hand-operated hydraulic pump attached to the right-hand side of the frame.

This wheel skate can be run under a wheel on the aircraft which has been jacked up only enough for the tyre to clear the floor, according to the company, thereby avoiding the unbalance which occurs when one wheel is jacked up unduly high. When the weight of the wheel is taken up on the hydraulic lift of the skate, the wheel is released from the undercarriage axle and pulled away, supported vertically by the upright frame and the holding hooks.

The lever end is pivoted in a bracket on a removable sleeve which slides over the axle. The broad, curved foot attached to the lever is pressed against the tyre to pry the bead from the rim.

The skate is then rolled under an electric hoist provided with a double-pronged hook which is lowered over the tyre and engaged securely in the brake drum of the rim. By means of the hoist, the wheel is picked up and conveyed by an overhead rail to a tyre-removing stand. Here it is swung on to an axle which is a duplicate of the axle on the aircraft, and is located at a convenient working height. This stand is of simple channel-steel construction



Wheel skate to facilitate changing tyres on U.S. Army transport aircraft.

TYRE CHANGING

anchored to the floor by straddle clamps; it can be made readily in almost any hangar.

The problem of breaking the bead rubber away from the rim was solved by equally simple means. Two long, manually operated levers are pivoted in brackets on the stand axle, and each has a wide, curved foot near the pivoted end, disposed so that it can be pressed against the tyre side-wall adjacent to the bead. Two operators rotate the wheel about 2in. at a time, then press the bead away from the rim with the levers, repeating the operation until the tyre is entirely free. Due to the length of the levers and the position of the pressing feet in relation to the fulcrums, great pressure can be exerted against the tyre without damaging it. The complete operation takes about 20 minutes.

After the tyre has been loosened, a flexible sling is lowered from the electric hoist and placed around the tyre, which is then lifted from the stand by the hoist. The skate is then used to remove the wheel rim from the stand.

The several pieces of equipment are simple to operate, and are so compact that the whole tyre-changing process can be done near the aircraft being serviced.

Empire Central Flying School

World-renowned Flying-training Unit Visited : Thirty-one Years of Outstanding Work Reviewed

THE Empire Central Flying School was formed, as such, in April, 1942, as a result of the Empire Aircrew Training Conference held earlier in that year, to ensure that flying instruction throughout the Empire should be as progressive and of as high a standard as possible. Before describing its present work it may be useful to recall its history.

A short history of the Empire Central Flying School appeared in *Flight* of September 24th, 1942, and for the benefit of those readers who did not see that issue, and as a brief "refresher" to those who did, we will reiterate the main facts.

The original Central Flying School was founded in 1912 and was stationed at Upavon on Salisbury Plain, being the first original unit of the Royal Flying Corps. The first Commanding Officer was Captain Godfrey Paine, R.N., who later became an Air Vice-Marshal, and his second in command was Major (now Lord) Trenchard.

When the C.F.S. was first founded all *ab initio* training was carried out at civil schools. Men who had learned to fly at the civil schools and who wished to join the Royal Flying Corps, having satisfied the civilian authorities of their competency to fly, progressed to the Central Flying School where "wings" were granted which transformed them into military or naval pilots.

First Expansion

The civilian schools ceased to function with the outbreak of the 1914-18 war, and it soon became obvious that no single school could possibly cope with the whole flying training for the rapidly expanding air services. This led to the formation of a number of other flying training schools which were started as offshoots from the original foundation.

Eventually the school at Upavon became a specialised unit for instructing air fighting and was officially designated the Flying Training Establishment and Fighting School. It had become a vital necessity due to our considerable losses of young pilots who had virtually no knowledge of air-fighting tactics. Flying training, as such, was then focused at the special School of Flying, Gosport, where, under the command of Lt. Col. Smith-Barry, the art of flying instruction was first systematised.

Previous to this there had been no form of even elementary standardisation or conformity in the methods of instruction. Gosport did lay down an instructional foundation, and although it was unable to train all the instructors required to meet the war demand, it was able to train a sufficient number of them to pass on their training to others.

After the armistice Gosport closed down and the reduced demands for pilots enabled the Central Flying School at Upavon to be resurrected and again take up ordinary flying instruction with the addition of a certain amount of *ab initio* training as well. The basis of the present system of flying instruction was then brought into being, the whole training programme was mapped out and consisted essentially of a number of Flying Training Schools all employing C.F.S.-trained instructors. The first course for instructors under this system was held in 1920.

Representatives of twenty-odd nations have at various times studied flying at C.F.S. Many men to-day bearing famous names are in the records as having been on the staff of the school or having taken a course there. Names like: Marshal of the Royal Air Force Sir John Salmond; Air Chief Marshal Sir Edgar Ludlow-Hewitt; Air Chief Marshal Sir Philip Joubert de la Ferté; Air Chief Marshal Sir Arthur Longmore. Two of the most famous fighter pilots of this war, Wing Cdr. Bader and Grp. Capt. V. Beamish, were students there.

The unit moved from Upavon in 1926, and was stationed at Wittering until 1935, when it moved to its present site.

Basic Methods

The work of the school to-day is more closely allied to the old Gosport School than the original C.F.S., in that it is concerned more with the co-ordination and perfection of training methods rather than actual instruction. The art of instruction is taught basically at the many existing Flying Instructors' Schools in various parts of the Empire.

It is because the training of pilots for the United Nations has become such a world-wide organisation that C.F.S. has had the prefix Empire added, and its function changed for what is, in effect, a Training Staff College or Parliament of Flying.

There have been, up to now, six courses or terms in which experienced officers from Great Britain, Australia, New Zealand, Canada, South Africa, Rhodesia and the United States, the Royal Navy, the U.S. Navy and U.S. Marines come to E.C.F.S. to pool and gather knowledge. Many have operational experience of contemporary flying in various theatres of war; some come straight from operational tours and return to take up responsible positions in the Training Scheme, whilst a small proportion become very interested in a particular aspect of their research work at the school and remain for a further term.

The flag of Air Commodore G. S. Oddie, D.F.C., A.F.C., flies over the Headquarters Building. He is Commandant of the school, having been Chief Flying Instructor at No. 3 F.T.S. from 1932-36 and for fourteen months Deputy-Director of Flying Training at the Air Ministry. The C.F.I. is Wing Cdr. A. J. Shelfoon, A.F.C., R.C.A.F., who, before he came to England, had very valuable experience commanding the Canadian Visiting Flight, which inspects the numerous flying schools spread over the Dominion. Wing Cdr. Kermode, who is the Chief Ground Instructor, has been associated with training in the Service for more than twenty years, and his name will no doubt

be familiar to many aeronautical students as the author of various text books. He has played a prominent part in the technical training of the Royal Air Force at Henlow, Cranwell, Halton and Farnborough, and has experience of flying training in both this country and the U.S.A.

It must be realised that in the present-day training scheme, of which the E.C.F.S. is the hub, there are many establishments whose sole specialised function is to produce flying instructors. The tremendous volume of data and experience gathered on training methods has to be co-ordinated and sifted as new types and fresh devices come into being. The school functions, in effect, as a conference in permanent session with the members continually changing, all of whom are provided with the means to try out practically the work on which they are engaged.

Probably the main work at present being undertaken by the school is the formulation of a universal standard of instruction; that is, a uniform flying training scheme and sequence which is equally applicable, with comparable efficiency, to all flying training establishments, no matter where they are situated, or what trainers they employ.

Discussions and debates at which the whole school is present are frequently held. The proceedings are conducted in a democratic "all-in" manner, and anyone who has any views on the subject under discussion is at liberty to stand up and impart his approval or condemnation. Sub-committees are formed to deal with particularly difficult aspects of problems, and at the end of each term a series of recommendations is drawn up and presented to the Director of Flying Training at the Air Ministry.

The actual flying side of the school is divided between the staff flights, respectively Research Flight, Handling Flight and Examining Flight, and the experimental and research flying is done by the students. There are usually more than twenty different types of aircraft at the school in addition to the numerous experimental instruments and considerable material available to everyone.

Ground Flying

Instruction by means of synthetic trainers is being intensively investigated, and some of the devices, of which the Link Trainer was probably the forerunner, are most ingenious. Films are extensively used for elementary and advanced air-to-air firing training, and although this method has been in use for many years, the modern state of film and camera technique has virtually lifted the use of films in training into a new and wider sphere.

The Research Flight is responsible for investigating the value and operation of any synthetic training devices. Psychological, and to a certain extent physiological, aspects of training are also a part of its work. For example, one of the current problems receiving attention is the true value of side-by-side seat training aircraft as opposed to tandem seat arrangements. Opinion on this matter is rather divided at the moment, there being many arguments put forth in support of each type, but so far as can be assessed at present, the side-by-side arrangement appears to be a little more popular than its rival.

Another problem is whether the "three-point" landing is better than a "wheeler" or vice versa. When it has been conclusively proven that one is better than the other it will be incorporated as standard general instructional practice.

The Handling Flight receives all new types of aircraft and is responsible for producing pilot's handling notes at the earliest moment for distribution to squadrons equipped with the new type. It is also responsible for revising existing pilot's notes on types of aircraft which have been modified, and co-ordinating the instructions on handling with the developments which are constantly taking place in the effort to perfect flying instruction.

The Examining Flight is staffed by highly experienced instructors who visit the various training establishments all over this country in order to test individual instructors. Reports are constantly being made on the methods in which training is given at each school, and the instructors at the schools are thus kept in personal contact with the latest trends in flying instruction.

So much for the staff basis of the school; students are given every opportunity to discuss their pet theories with more experienced officers, and to test their theories in actual experiment. Briefing, that word which has come to mean in the Service any prior verbal discussion to a practical interpretation, is carried out before each flight. The student plans his work, it is gone over in the Briefing Room, and he has all the aids he could possibly desire. Then he goes out and does his practical research.

One of the most interesting places on the station is the Control Tower. Here is a very completely equipped nerve centre of all flying in progress. Radio equipment of a comprehensive range, blind-flying radio beam approach control, airfield lighting control (for night exercises) which by an arrangement of carefully-positioned lights guides the pilot round his final circuit and leads him in.

Airfield Control Panel

All these are literally press-button control panels congregated in one room, together with a map of the airfield showing the current obstruction for night operation. There is a clever little installation which automatically registers on a panel the obtaining wind direction operating the master indicator on top of the tower.

Pilots making a night flight to any part of the country can be instantaneously informed of any restricted areas, beacons and variable obstructions, such as barrage balloons.

Every useful aid towards making flying easier and safer, if it is any real good at all, is installed in the E.C.F.S. control tower.

It may interest readers, whether in the R.A.F. or not, to know that the basic standard to be met by candidates for a course at the school is very high. One of the main requirements is at least 1,000 hours as a Flying Instructor, or alternatively one operational tour. When vacancies occur, the Air Ministry notify Overseas and Home Commands, who in turn notify their respective Groups. Key men are selected and their names submitted by the various units to Group Headquarters. Finally the Air Ministry sift the possibles and the best are accepted. Truly an E.C.F.S. course is a coveted prize.

Students are examined and assessed as to their ability and are then graded into one of five groups: A1, Exceptional; A2, Above average; B, Capable; C, With experience will prove a good instructor. A1 is for all types of aircraft and the other categories are applicable only to elementary, single-engined, or multi-engined types alone. A further category, Q, is granted to students who take only a short course and is applicable only to specific aircraft; glider instructors also hold a Q certificate.

VICTORY ON THE HORIZON

AIR MARSHAL SIR TRAFFORD LEIGH-MALLORY, A.O.C.-in-C. Fighter Command, informally accepting two Spitfires recently presented to the R.A.F. by British residents in Cuba and their Cuban friends, said: "The Spitfires, the finest fighting machines in the air, will be used not only in the defence of this country but in seeking out and destroying the Germans over their own country and occupied Europe."

The ceremony took place at an airfield near London. The machines, over which the Cuban flag flew, were christened "Cuba Libre" (Free Cuba) and "The Spirit of Marti" by the Cuban Ambassador, H. E. Guillermo de Blanck.

Speaking in Spanish, the Ambassador wished both aircraft luck, and added: "These new wings will hasten the Allied victory already clearly seen on the horizon."

HE BLUFFED THE ITALIANS

MR. R. SWIFT, general manager of aircraft engine production of the Rolls-Royce Company, said at a "Battle of Britain" exhibition recently opened in Liverpool by Air Vice-Marshal Collishaw, R.A.F.: "When we delivered the first—ever—Hurricane fighter aircraft to Air Vice-Marshal (then Air Commodore) Collishaw in the Western Desert just after the Italians came into the war, he decided to try a big bluff on the Italians. He flew that Hurricane seven times a day or more and landed and took off from different airfields. The result was that the Italians thought we had hundreds of these Hurricanes out there when actually we had only one."

Efficiency Through Comfort

An Important Aspect of Aircraft Design Relevant to the Physical Well-being and Efficiency of Air Crews

This is the second article in the series based on abstracts from the world's scientific and technical press.

The subjects dealt with in this series will fall into one of the seven following groups :

- *A Aerodynamics and Hydronamics.*
- *B Aircraft and Airscrews.*
- *C Engines and Accessories.*
- *D Materials and Methods.*
- *E Instruments and Devices.*
- *F Production.*
- *G Physiology and War Medicine.*

Each article appearing will carry its classification group letter followed by a number to indicate that it is the 2nd, 7th, 4th, etc., in that group to be published, and a reference of issue dates of previous numbers of Flight *in which appeared articles of the same subject group. The articles will not appear in the alphabetical order of their groups.*

Group Classification : G.1.

THE exigencies of war affect the bodily comfort of nearly everyone actively engaged. The extent to which comfort is affected depends largely upon the operational conditions under which they are living, but in most instances it cannot truthfully be said that comfort, as such, affects their efficiency to a very great degree.

In the case of men who fly at night, over lengthy periods, or at great heights (or in some cases a combination of all three), the state of comfort, i.e., bodily ease, in which they operate is affected almost insidiously. Vibration, noise, impaired visibility, among other things, are factors which are an integral part of contemporary flying. Yet they are so obliviously accepted, and recede into the background of consciousness so easily, that their destructive effect on the efficiency, both mental and physical, of the men concerned has not in the past been given the amount of attention warranted by so important a subject.

F. Ruff, in the digest of a *Lilienthal* lecture, deals with the effects of vibration and also some physiological problems of night flying and night combat.

Long-distance flights subject the crew to considerable fatigue, and this will adversely affect fighting capacity should the aircraft be attacked. The three most common factors which accelerate fatigue are (a) cramped quarters, (b) noise, and (c) vibration.

Apparently the Germans are actively engaged on the reduction of discomfort in their aircraft, for Ruff asserts "the so-called 'comfortisation' of military aircraft is at last receiving attention."

It is not enough to provide a seat and expect that this necessarily implies rest. Continuous contraction of any muscles to hold the body in a required position must be avoided. Much has been done for the pilot in providing adjustable seats and placing all the controls in suitable positions, but the remainder of the crew deserve equal attention, especially regarding vibration.

Vibration

Modern research has shown that the frequencies of such vibration, as well as their amplitude, have a pronounced physiological effect. Thus for horizontal seat vibrations up to 0.5/sec. the body executes parallel vibrations as a whole, but at 0.6/sec. the head begins to lag behind, and may get into resonance at about 1.6/sec. At higher frequencies the node (point of intersection of vibratory axes, or centre of rest) travels downwards along the spine, until at frequencies above 4/sec. only the seat takes part in the motion.

In the case of vertical seat vibrations, eye resonance may be set up, and this will render ground observation difficult. Apart from these mechanical effects, continuous exposure to vibration may produce grave disturbances of the nervous system and the failure of reflexes. The problem of vibration thus deserves the closest attention in assessing the comfort of the crew and their resistance to fatigue.

Night flying presents a special problem, particularly with reference to night combat between aircraft, the success or failure of which is largely dependent on whichever of the combatants sees the other first. Acuteness of vision under such circumstances varies considerably for different individuals.

Ruff contends that it must be the object of physiological tests to select suitable candidates and weed out those individuals suffering from so-called "night blindness," i.e., lack of response of the retina rods to low-intensity stimulæ. Briefly, the retina of the eye is of cellular construction, some of the cells being cone-shaped and some cylindrical; the cones react to bright light (high intensity stimulæ) and the rods to dim light (low intensity stimulæ).

For the normal individual the rod response will increase up to 100,000 times if the eye is kept unstimulated with maximum pupil diameter over a period of 30 to 40 minutes. Unfortunately, this adaptation is completely destroyed by a bright light, such as a gun flash or tracer ammunition. For well-camouflaged aircraft, therefore, night fighting is necessarily restricted to a short gun burst, after which contact is probably lost through inability of either side to see the other.

Diet

Correct diet of vitamin A produces a pigment which assists the reaction of the retina rods to poor illumination; by this means the adaptation of the eye from bright to poor light can be facilitated, the time taken for such adaptation being on the average 50 to 60 seconds, although, of course, it differs with the individual.

Even the internal illumination of the aircraft instruments can have a serious effect in reducing the adaptation rate and efficiency, but by employing luminescent paints of a suitable colour (red), the effect on the observer could be considerably reduced.

An article in the *Journal of the Aeronautical Sciences* by Messrs. Carson, Miles and Stevens deals with vision, hearing and aeronautical design from the American angle.

The authors aver that it is desirable that pilots, observers and gunners should be placed as near as possible to the aircraft windows. This not only increases the angle of vision, but it is also generally easier to provide the requisite transparent area free from opaque accessories; at the same time blemishes or scratches in the window, being out of focus, are less bothersome.

For this reason, turrets in which guns are mounted at the side and rather low down are preferable to the orthodox type in which the gunner is placed behind the gun. In the latter case, it is difficult to reduce the distance between eye and window (aiming panel) below 29 inches (9in. eye to gunsight and 20in. gunsight to aiming panel).

The field of view in this case is only about 28 deg. (tunnel vision), and, moreover, may be partly obstructed by the gun structure and window frames. With lateral guns a much closer position to the front panel should generally be possible for the gunner.

The authors of this article also assert that special attention should be paid to instrument lighting for night flying, and they emphasise that the illuminated area should be restricted to the efficient minimum and only red light used.

It is well known that the tendency to air-sickness is reduced if visual contact with the ground can be maintained. Many troop-carrying gliders suffer in this respect,

EFFICIENCY THROUGH COMFORT

with the result that the fighting efficiency of the men after landing may be seriously affected.

The reduction of noise, which contributes a great deal to the acceleration of fatigue, is a slightly more difficult problem. Both airscrew slipstream and engine noise depend to a certain extent on the horse-power, and with the larger power units now coming into general use, the noise problem becomes serious.

Even if the engine and airscrew noise could be silenced, the noise emanating from the turbulent airstream passing over the fuselage is very considerable. It is almost impossible to hold a conversation inside a glider towed at 150 m.p.h., the noise level being of the order of 115 decibels.

The most important practical effect of aircraft noise is the masking of communications. Articulation tests have shown that with standard (American) military interphone equipment, a listener is able to understand only about 50 per cent. of the spoken words in the presence of a background noise of 120 db.

Matters can be improved by the provision of sound-absorbing material which, although it does not appreciably reduce the overall noise level, does cut down the harmful high-frequency components and facilitates conversation.

Another remedy consists in improving the response characteristics of the microphone and earphone (high fidelity) and in shielding these instruments as far as possible from extraneous sounds. The oxygen mask provides facilities for microphone shielding which is still often neglected.

It should be remembered that the standard British equipment combines the oxygen mask and microphone in one unit. The earphones and the ear of the listener can be shielded by means of an acoustic socket forming a tight seal against the side of the head.

Both seeing and hearing, if accompanied by prolonged attentive effort, cause fatigue and lessen efficiency of the crew. Elaborate precautions are taken to ensure the proper function of the aircraft mechanism under the arduous conditions of modern operation, and the authors make a plea that at least equal attention be paid to the physiological requirements of the flying personnel.

The Farner W.F.12

A Cirrus-engined Swiss Design with Unorthodox Features : Shaft Drive and Tricycle Undercarriage

AT Grenchen, which is one of Switzerland's gliding centres, the Farner Flugzeugbau A.G. have for some years been engaged on the production of gliders. In 1934, when the firm was taken over by W. Farner, the number of employees was only ten, but it has since been expanded and employs at present about 100 skilled men. Apart from glider production the Grenchen plant is mainly engaged in the manufacture of different components for, and the servicing of, Swiss military and civil transport aircraft.

Although only modest facilities appear to exist for quantity production, it was announced some ten months ago that the company is to go over to actual construction.

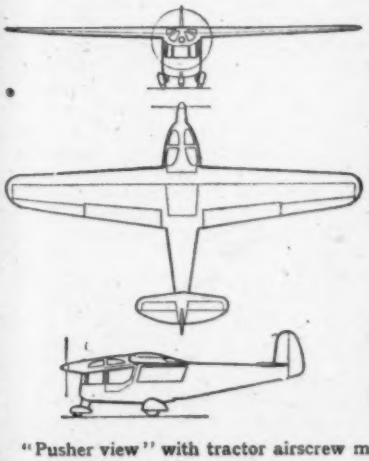
At present the Farner Flugzeugbau are putting through its final paces a new aircraft of their own design, designated the W.F.12. This two-seater trainer and touring aircraft is a high-wing monoplane with a fixed and faired undercarriage and a nose wheel landing gear. The cabin has side-by-side seating accommodation with dual controls.

Most remarkable feature of the W.F.12 is its power plant installation. The British Cirrus-Minor 4-cylinder air-cooled in-line engine of 90 h.p. for take-off and of 82 h.p. cruising power at 2,300 r.p.m. is mounted in the fuselage aft of the cabin. The airscrew extension shaft comprises two parts linked together and connected with the airscrew shaft by means of universal joints; it runs over the top of the cabin and is supported forward in a structure projecting ahead of the top of the fuselage nose section.

In this manner the airscrew axis lies in a plane with the wing and the view forward and downward is unimpaired.

The designers claim that this method of engine installation opens the way for a variety of developments of the fuselage shape, etc.

Preliminary data of dimensions and performance are as follows: Span, 36.1ft.; length, 24.4ft.; height, 8.5ft.; wing area, 172 sq. ft.; empty weight, 1,235 lb.; gross weight, 1,765 lb. Wing loading is 10.24 lb./sq. ft., and power loading 19.6 lb./h.p. Maximum speed is 109 m.p.h. and landing speed (with flaps) 46.6 m.p.h.



"Pusher view" with tractor airscrew may be said to be the keynote to the design of this Swiss two-seater, the Farner W.F.12. The engine is a 90 h.p. Cirrus Minor.

Pitch Panic

How Hurried Changes from Two-pitch to Constant-speed Airscrews Were Made in Time for the Battle of Britain

AS long ago as 1936 the De Havilland Co. had both Spitfire and Hurricane included in their programme for variable-pitch airscrews, but in those days the accent was on lightness where fighters were concerned, and as both types could leave the ground fairly well with fixed-pitch two-bladed wooden airscrews, the company was not instructed to provide v.p. until much later—in fact not until 1938, when pilots were beginning to say that they needed variable pitch for safety in night take-offs. The R.A.F. expansion was then going ahead strongly and two-pitch airscrews were specified for single-engined fighters because quantity deliveries of these could be given more quickly than of the constant-speed type. By the time Paris fell, De Havillands had delivered about 1,250 two-pitch airscrews for the Hurricane, 1,000 for the Spitfire and 325 for the Defiant. They were delivering constant-speed types then in quantity for Wellington Ic, Hampden, Beaufort, Beaufighter, Whirlwind, Stirling, Manchester, etc., but the single-engined fighters, the Blenheim and other types, were still being retained as two-pitch installations.

NOT until now has it become possible to tell the story of how a small band of men, working sometimes 20 hours or more out of the 24, converted Hurricane and Spitfire Merlins for constant-speed airscrews. It is no exaggeration to say that but for their heroic efforts the Battle of Britain might have ended differently.

At the time of the Battle of France airscrew engineers and test pilots used to hear at the fighter stations that the Me 109s had a slightly greater ceiling than our fighters, though their manœuvrability high up was not so good as ours, and that they had an advantage in accelerating and power diving. Our two-pitch fighters had to throttle back in the dive to avoid over-revving. It was also clear that constant-speed control would give us a much improved climb for intercepting. Changing from fine to coarse pitch with the two-pitch control, as set for the Spitfire's rated altitude, was rather like changing from bottom to top gear in a small four-speed car. In many talks with hard-worked pilots during Dunkirk week and thereabouts all agreed that constant-speeding would be a considerable help, especially as it did not mean new airscrews, but only governor units, piping, etc.

First Spitfire Converted

On Sunday, June 9, when the Germans were pouring across the Marne, De Havillands had a 'phone call from an engineer officer asking whether they could convert one Spitfire as a sample. They said they could, quite easily, and sent one of their test pilots with an engineer to explain that the work involved would not take many hours, but that if they were likely to be called upon to make conversions in quantity they would have to be given authority to divert materials and labour from the contracts upon which they were fully engaged.

They at once set about the parts and pipe lines for the trial conversion. These were ready in about four days, and half a dozen picked D.H. airscrew installation engineers effected the conversion at an airfield during one night, while the Huns were rejoicing in Paris and Goering was regrouping for the attack on England.

A report dated June 20, from a D.H. test pilot, Mr. E. Lane-Burslem, stated that he had flown the converted Spitfire and so had Sqn. Ldr. Cooke, who commanded 65 Squadron, and a number of his pilots. They estimated that there was more than 7,000ft. of increase in ceiling, and the manœuvrability at height was much improved, not to mention the obvious advantages of reduced take-off run and increased rate of climb—in brief, the ability to use maximum efficiency at any altitude in all conditions.

Enthusiastic for other squadrons as well as his own, and backed up by his engineer officer Flt. Lt. McGrath, Sqn. Ldr. Cooke got in touch with the technical authorities and interest spread rapidly. Among the experienced operational pilots who were first to appreciate the advantages was Wing Cdr. H. Broadhurst.

Conversion in the Field

On Saturday, June 22nd, De Havillands were verbally instructed to convert in the field all Spitfires, Hurricanes and Defiants, with priority over other contracts, and the Spitfires had to be done first. Sqn. Ldr. Cooke, in his constant-speed Spitfire, led his two-pitch squadron into battle and the practical advantage was immediately apparent. Unfortunately, on his second sortie he was killed.

Minutes of a meeting held on June 22nd with the Senior Technical Officer of Fighter Command relate that de Havillands would start the conversion at twelve Spitfire stations on Tuesday, June 25th (less than a week after the first test flight) and could provide twelve men capable of supervising a station apiece; that the firm estimated that each squadron would take ten days to convert, and that all Spitfire squadrons could be completed by July 20th. The same minutes recorded that de Havillands had put in hand the production of 500 conversion sets, without contract cover, and that these would be coming out at the rate of 20 sets daily from June 24th, two days later. Supermarines were to be supplied with 20 sets per week from June 25th for aircraft coming off the production line; this would mean that two-thirds of the Spitfire production from that day onward would be "constant-speed." After completing the squadrons the D.H. engineers were to modify any Spitfires in storage at Maintenance Units (the word "any" had a grim significance!)

A small quantity of constant-speed units produced for the French Government, useless to them after the collapse, formed the nucleus for the job that began on June 25th, and bulk production duly followed without a break. The conversion called for this constant-speed unit; a small shaft drive to connect it to the engine; four external engine oil pipes; a complete cockpit control with conduit, and detail parts. The airscrews did not have to be changed, having been designed for constant-speeding, but each had to be dismantled to move the index pins so as to give full pitch range and shift the range bodily several degrees towards the coarse limit. As Rolls-Royce could not, consistent with other heavy demands, produce the quill shafts for driving the c.s. units, or the engine oil pipes, the data were given to de Havillands and the facilities of the Gipsy engine factory were pressed into service to make over 1,000 sets of these parts. Everybody in the D.H. organisation who could contribute anything was transferred to this job. Several outside suppliers were involved, and in particular it may be recalled that M.R.C., Ltd., the makers of the pilot's control, astonished at the demands made on them, co-operated magnificently. Many of the "inside" people did remarkable work; for instance, Mr. Ivor Jones, of de Havilland's Progress Department, who chased and controlled all the parts supplied.

Day and night air raids on England began about Monday, June 24th. The next day 13 D.H. engineers set forth in cars for twelve Spitfire stations. (Two went to one station.) Each was provided with about six conversion

PITCH PANIC

sets to be going on with. Their names were: W. E. Crease; J. B. Houston; S. C. Bentley; W. M. Bentley; B. J. de Sibour; A. Moser; C. A. Luke; A. Metz; W. Hook; T. Beavis; W. Pickford; S. J. Reed; A. J. Tribell.

At each station the D.H. man on arrival asked for a picked crew of N.C.O.s and fitters, converting the first aircraft himself and instructing the men at the same time. The second aircraft was then converted by the R.A.F. crew with his help, and the third with his supervision only. After that, if all was going well, he would proceed to the next station. Youthful engineers like de Sibour found themselves directing senior flight sergeants and quite big squads of fitters. Mr. Lane-Burslem flight-tested the first machine and instructed the R.A.F. pilots in the constant-speed operation, and then flew on to the next station.

Working 150 Hours a Week

The working times of the D.H. engineers during the ensuing weeks averaged about 105 to 110 hours (15 to 16 hours a day), with instances of 130 and up to 150 hours (19 to 21½ hours out of the 24). At some squadrons as many as four and five Spitfires were converted and test-flown in a day.

There was much improvisation at the stations. Home-made arbors were contrived for dismantling the airscrews and off-set spanners were made to get at nuts without having to remove the Merlin glycol header tanks.

Some of the squadrons which had borne the brunt at Dunkirk and were resting, in South Wales and elsewhere, flew their Spitfires across England in ones and twos to be converted, and some aircraft were flown for conversion to De Havilland's own factory.

The rush had its light moments. As all the initial production and conversion arrangements were made without contract cover of any kind, De Havillands had the authorities on one side pressing almost impossible promises out of them, while other branches were cautioning them that their action was irregular. A contracts clerk said, "We shall probably never get paid for this," and an engineer was heard to reply, "If it isn't done we may never live to be paid for anything." Even in March, 1943, the De Havilland contracts department were still being called upon for the routine evidence that certain aircraft had been converted.

800 Sets in 44 Days

An entry dated Friday, August 2nd, records that by then, 44 days after the test flight of the first converted Spitfire, the production of conversion sets for all existing Spitfires (more than 800 sets, fulfilling the schedule of 20 a day) was complete, and they had therefore started producing for the Supermarine assembly line; De Havillands then had 400 Hurricane conversion sets in hand and expected to convert a total of 700, after which constant-speed airscrews would be embodied in the new aircraft.

The worst of the rush was over, six days before the *Luftwaffe's* mass attacks began, and a chance diary entry records that the company was already busy on another urgent job, of fitting airscrews to 24 Hurricanes to be sent at once to the Middle East! Another diary entry of that month which serves as a reminder of gloomy expectations records that De Havillands were doing 1,500 sets of bomb racks for Tiger Moths!

Those July raids had, fortunately, been little more than skirmishes. If only the German High Command had realised! The mass attacks on Channel ports and shipping which began the intended final assault upon Britain did not start until Thursday, August 8th—but all our Spitfires had constant-speed airscrews by then. By August 16th 1,051 Spitfires and Hurricanes had been converted—an average of 20.2 aircraft per day, over 52 days. In the eight days, August 8th to 15th, the German losses averaged 81 aircraft daily—four times our own losses. One of the highest officers of Fighter Command remarked to a D.H. engineer that but for the conversion job the figures might have been reversed.

BLIND LANDING IN MID-ATLANTIC

THE story has been told of an amazing blind landing by a Fleet Air Arm pilot on the tiny flight deck of an escort carrier operating in the Atlantic.

The pilot was Sub Lt. (A) R. A. Singleton, R.N.V.R., and his observer Lt. Cdr. (A) J. Palmer, R.N.V.R.

Within ten minutes of the Swordfish taking off on reconnaissance patrol over a convoy the ships were enveloped in thick fog. The carrier had her fog buoy streamed, and this was used by the pilot as a guide for his approach. His first attempt failed, but he circled the ship and successfully landed at the second try, with visibility only about 50 yards.

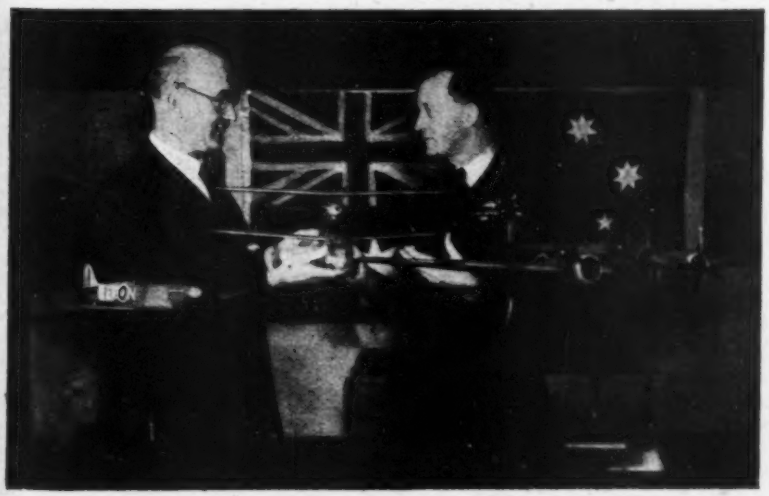
Lighted "bats" were used by the flight deck officer.

ATLANTIC RECORD

BY making the non-stop flight of 3,100 statute miles from Montreal to an airport on the west coast of Britain in 11 hours 35 minutes, Capt. Richard Allen recently eclipsed all long-distance and transatlantic air-speed records. Capt. Allen was flying a B.24 Liberator on the R.A.F. Transport Command North Atlantic shuttle ferry for British Overseas Airways Corporation.

In this flight he clipped 21 minutes off the previous best, put up some weeks ago by a British-built Lancaster piloted by Capt. M. B. Barclay, of Perth, Scotland, on the Canadian Government Atlantic service operated by Trans-Canada Airlines.

The time of 11 hours 35 minutes was calculated from actual take-off to landing. On the flight the aircraft was helped by a strong tail wind which raised the average "ground" speed to 275 m.p.h.



R.A.A.F. WAR MUSEUM

The Royal Australian Air Force has started to collect souvenirs and other exhibition war material for the Australian equivalent of our Imperial War Museum. This picture shows Major H. R. Kilner, M.C., chief of the aircraft section of Vickers-Armstrongs, Ltd., and president of the Society of British Aircraft Constructors, presenting models of Walrus, Spitfire and Wellington aircraft to Air Vice-Marshal H. N. Wrigley, C.B.E., D.F.C., A.F.C., A.O.C. R.A.A.F. Overseas Headquarters in London.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

BOMBER ARMAMENT

A Leaf from the German Book

I AM much interested in "Young Spotter's" letter. What he says is true. The respective m.h.p.s of the 0.303in., 0.5in., 15 mm. and 20 mm. guns are 77, 296, 515, and 632. Thus one 20 mm. Hispano cannon has more m.h.p. than eight 0.303in. machine guns.

The idea that the change-over to 0.5in. machine guns (or cannon) is not worth the loss of production will not hold water. We still have several years more war yet—if not with Germany, with Japan—and if we are going to have the best weapons available at all we ought to have them now.

It should not prove difficult to design a rear position like the Fortress II's, but with cannon. No difficulties in squeezing both gunner and guns into one position occur in this turret. Perhaps a similar front turret could be designed.

The question of additional weight can be solved by building larger aircraft with more or higher horse-power engines, as is the present trend in fighter development. The additional horse-power more than compensates in speed for the higher weight.

As well as the 0.5in., 20 mm. cannon will be (or perhaps are now) advantageous for bombers. The Germans have shown that they appreciate this; 20 mm. cannon are fitted to the Ju 290 (90s), He 177, Ju 88E, and Do 217E. Let us take a leaf out of their book—"*Fas est et ab hoste doceri.*"

"AN OLD SPOTTER."

TRIMMING TABS

Fin and Rudder Effect

THE argument of your correspondent B. B. and B in *Flight*, November 18th, breaks down in his phrase "the movement of the tab deflects the rudder until the pressure on the port side is equal to the pressure on the starboard side.

Consider a fin and rudder assembly with the trim tab neutral and the whole in equilibrium. Then assume the trim tab is moved to port. The result will be an out of balance force to starboard (Fig. 1). This force has a moment about the rudder hinge axis which causes the rudder to swing to starboard (all this is assuming the pilot is flying "feet off").

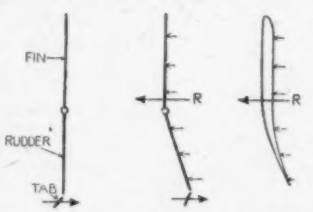


FIG.1 FIG.2 FIG.3

The effect of this is to make the fin and rudder into a cambered aerofoil as shown in Fig. 3 with forces acting as shown. The part of these forces which act on the rudder tend to negative the moment of the tab forces, and the movement ceases when the rudder forces are in equilibrium.

The centre of pressure of the forces on the starboard side of the rudder will, however, be much nearer to the hinge axis than the centre of pressure of the tab loads (say, quarter of the distance), and therefore they will be much greater. Taking in also the fin loads it will be seen that the resulting force from starboard to port *acting on the fin and rudder assembly as a whole* will be eight or more times that acting on the trim tab and in the opposite direction.

The total result will be a force R acting on the fin and rudder which will turn the aircraft to starboard.

H. A. CARLESS.

MERLIN MYSTERY

Could It Have Been Blowback ?

I WAS particularly interested in the letter from P/O. Goodchild in your issue of November 11th concerning the "kicking" of the throttle control when testing his magnetos.

I had a very similar case only a fortnight ago when running up a Merlin XXVIII; when the starboard magneto was switched off at +7 lb. boost I experienced a violent "kick" of the control. In this case there was a definite mag. drop of 150/200 r.p.m., but the "kicking" persisted at least three or four times.

The mag. drop was traced to a faulty plug, and I had in mind at the time the possibility of a small blowback in the carburettor forcing the butterflies into a closed position. The action of the differential in the cross-shaft tends to disprove this point, but it is possible that the sudden impulse on the linkwork was too rapid for the action of the boost servo-piston and the shock was transmitted direct to the cockpit control.

However, P/O. Goodchild had no magneto drop to speak of so the possibility of a blowback does not appear likely in his case.

At +6 lb. boost his magneto linkwork would be fully advanced; perhaps a contact breaker arm was too long, causing the linkwork to be strained at this point instead of toggling easy; this can often be felt on the cockpit control.

I would like to say that this was the only occasion I have ever come across this "kicking," and I am pleased to have P/O. Goodchild's letter as proof to my senior N.C.O. that I was not shooting a line!

K. H. FAIRBOTHAM (Cpl.).

AERONAUTICAL EDUCATION

Guidance Wanted by Town Planners

IN connection with aeronautical education, may I draw your attention to the desirability, especially from the point of view of aviation, of directing an important part of such education into a rather neglected quarter? I refer to the large body of town planners, civil engineers, etc., in the various town planning departments of both central and local government. This body of professional men is becoming increasingly responsible for the preparation of operative planning schemes, many of which are now well in hand, over the whole country—schemes which should provide for the widest development of post-war aviation.

As one of those concerned, and as a member of the town planning institute, I am convinced that many of the above schemes ignore the potentialities of post-war aviation completely or to a most prejudicial degree. You will no doubt agree that few, if any, of the pre-war civil airports were fully satisfactory in either design or location, particularly in relation to town centres. To date I have seen no reason to expect any improvement.

Bearing in mind that operative planning schemes are now being prepared which will "influence the development and life of a region for the next fifty years," there are several vital questions upon which the planners concerned should receive immediate and positive guidance, including, *inter alia*, those on the list attached. Such questions may already have been answered in part in current aviation literature, but few planners at present have any knowledge of fact or authoritative opinion, and I shall be pleased if any reader can indicate any such sources of information.

1. In the light of war developments, is there or is there not to be any real future demand for civil airports for *most* of our towns and cities? If so, for which towns?
2. Will development of home fuel resources render us independent of or less dependent on foreign supplies, or may other propulsive methods become a close reality?
3. What amended standards in airport design and size must be anticipated due to war developments in machine types, size and performance? What future trends can be clearly foreseen?
4. To what extent will the size and location of civil airports be influenced by the development of "vertical" take-off and landing for larger types of aircraft, especially in relation to town centres?
5. To what extent will modern "blind-flying" technique render airports possible for towns with a present "semi-permanent industrial haze"? (This question also anticipates some success in smoke abatement over the period.)
6. What effect will a full development of aviation *within* this country have upon trunk road proposals and height-zoning adjacent airports in particular, and upon the planning of town and countryside in general? (This question can only be answered jointly by aviation and planning authorities.)

R. H. MOODY,
Senior Planning and Engineering Assistant,
Oldham, Lancs.

SERVICE AVIATION

An N.A. Mitchell dropping instantaneous-fused bombs. On page 633 is a photograph of a new mark of Mitchell carrying a 75mm. cannon which fires a 13 lb. shell.

Royal Air Force and Fleet Air Arm News and Announcements

Promotion

GENERAL DUTIES BRANCH

Air Marshal (temp.) Sir E. L. GOSSAGE, K.C.B., C.V.O., D.S.O., M.C., to be Air Marshal. January 1st, 1943.

Retirement

GENERAL DUTIES BRANCH

Air Comdre. R. COLLISHAW, C.B., D.S.O., O.B.E., D.S.C., D.F.C., is placed on the retired list and retains the rank of Air Vice-Marshal.

Awards

Fleet Air Arm

THE KING has been graciously pleased to approve the following awards:—

For great courage and enterprise in attacks on enemy shipping:—

Bar to Distinguished Service Cross

Act. Temp. Lt. Cdr. (A) S. M. P. WALSH, D.S.C., R.N.V.R.

Distinguished Service Cross

Temp. Lt. (A) R. J. FISHER, R.N.Z.N.V.R.
Temp. Lt. (A) A. J. RUSHWORTH-LUND, R.N.V.R.
Temp. Sub Lt. (A) J. J. HITCH, R.N.V.R.
Temp. Sub Lt. (A) G. R. MORRIS, R.N.V.R.
Temp. Sub Lt. (A) G. McI. PATRICK, R.N.V.R.
Temp. Sub Lt. (A) G. McC. RUTHERFORD, R.N.V.R.

Royal Air Force Far East

THE KING has been graciously pleased on the advice of Australian Ministers to approve the following awards in recognition of gallantry displayed in flying operations against the enemy in the South-West Pacific area:—

Distinguished Flying Cross

Sqn. Ldr. W. T. M. BOULTON, R.A.A.F.
Sqn. Ldr. R. L. GORDON, R.A.A.F.
Act. Sqn. Ldr. E. M. GIBBS, R.A.F.

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations:—

Distinguished Service Order

Sqn. Ldr. P. G. POWELL, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.—Sqn. Ldr. Powell is a navigator whose unerring skill has contributed in a large way to the success achieved on many sorties, including the recent heavy attacks on Peenemunde and Berlin. In addition to his operational tasks, Sqn. Ldr. Powell has rendered yeoman service in the training of other navigators, and his excellent work has been reflected in their numerous successes.

Act. Sqn. Ldr. D. K. ALLPORT, D.F.C., R.A.F.V.R., No. 35 Sqn.—As navigator, this officer has participated in a large number of sorties, many of them demanding a high degree of skill and determination. Nevertheless, Sqn. Ldr. Allport has executed his tasks with exceptional ability, and his faultless work has contributed in a large measure to the successes obtained.

Act. Sqn. Ldr. E. W. IFOULD, D.F.C., R.A.A.F., No. 109 Sqn.—Since being awarded a Bar to the D.F.C., Sqn. Ldr. Ifould has taken part in a large number of sorties, most of which have been against targets in the Ruhr and in the Rhineland. He is a navigator of high merit, whose brilliant efforts and outstanding devotion to duty have been worthy of the highest praise.

Act. Sqn. Ldr. J. TURNBULL, D.F.C., R.A.F.V.R., No 109 Sqn.—This officer has completed a very large number of sorties and throughout has displayed navigational skill of the highest standard. He has at all times shown outstanding determination, and his record of successes is an excellent tribute to his faultless work. His example has been highly commendable.

Act. Flt. Lt. W. J. SENGER, D.F.C., R.C.A.F., No. 7 Sqn.—This officer has completed a very large number of sorties, involving attacks on a wide range of enemy targets. He has displayed skill of a high order, while his unfailing determination to inflict loss on the enemy has been a noteworthy feature of his work. Flt. Lt. Senger is a model of efficiency and his gallant example has proved a rare source of encouragement.

Act. Wing Cdr. D. R. BAGNALL, D.F.C., R.A.F.O., No. 40 Sqn.—This officer is a most inspiring leader whose great skill, fearlessness and unswerving devotion to duty have been reflected in the high morale of the squadron which has obtained many notable successes. One night in September, 1943, Wing Cdr. Bagnall participated in an attack on the marshalling yards at Battaglia and his accurate bombing was a feature of his praiseworthy efforts.

Second Bar to Distinguished Flying Cross

Sqn. Ldr. R. W. MCNAIR, D.F.C., R.C.A.F., No 421 (R.C.A.F.) Sqn.—Sqn. Ldr. McNair is a tenacious and confident fighter, whose outstanding ability has proved an inspiration to the squadron he commands. He has completed a large number of sorties and has destroyed fifteen and damaged many other enemy aircraft.

Bar to Distinguished Flying Cross

Act. Sqn. Ldr. G. L. HOWITT, D.F.C., R.A.F.V.R., No. 85 Sqn.—Sqn. Ldr. Howitt is a skilful and relentless fighter whose continued good work has been highly commendable. He has

FLEET AIR ARM INSIGNIA: (Top) Pilot's wings; (Centre) Observer's wings; (Bottom) Air Gunner's wings.

destroyed six enemy aircraft at night. Sqn. Ldr. Howitt is an efficient flight commander, whose courageous example has proved most encouraging.

Flt. Lt. A. LAMMER, D.F.C., R.A.F.V.R., No. 255 Sqn.—Flt. Lt. Lammer has been employed as senior navigation officer since February, 1942. By his hard work and conscientious application of his exceptional skill he has done much to raise the standard of navigation in the squadron. He has taken part in many operational missions, and has been instrumental in destroying five enemy aircraft at night.

Act. Wing Cdr. H. A. C. BIRD-WILSON, D.F.C., R.A.F.O.—From April, 1942, till May, 1943, this officer commanded and led his squadron on many operations, the majority being sweeps over enemy territory. Since joining his present unit as wing leader he has continued to take part in numerous sorties, displaying masterly leadership on every occasion and enabling his wing to destroy three enemy aircraft. Most of these sorties were undertaken as escort to medium bombers, none of which were lost by enemy action.

Act. Sqn. Ldr. J. E. STORRAR, D.F.C., R.A.F.O., No. 65 Sqn.—Since the award of the D.F.C., Sqn. Ldr. Storrar has destroyed five enemy aircraft, probably destroyed two more and damaged four in the air. He has always led his squadron with skill and determination, displaying great keenness to engage the enemy.

Flt. Lt. J. H. TURNBULL, D.F.C., R.C.A.F., No. 600 Sqn.—As pilot and observer respectively, this officer and airman have displayed outstanding skill in operations at night and have destroyed ten enemy aircraft. They have displayed exceptional keenness and determination, setting an example of the highest order.

Act. Flt. Lt. W. I. H. MAGUIRE, D.F.C., R.A.F.V.R., No. 154 Sqn.—Flt. Lt. Maguire is a relentless and skilful pilot. He has at all times displayed great keenness to engage the enemy. He has destroyed twelve enemy aircraft in combat.

Distinguished Flying Cross

Lt. D. F. T. ANDERSON, S.A.A.F., No. 22 (S.A.A.F.) Sqn.
P/O. G. W. C. CANDLIN, D.F.M., R.A.F.V.R., No. 83 Sqn.
P/O. R. KING, R.A.A.F., No. 83 Sqn.
P/O. W. L. WEBSTER, R.A.F.V.R., No. 83 Sqn.
Act. Sqn. Ldr. R. R. MEGGINSON, D.F.M., R.A.F.V.R., No. 15 Sqn.
Act. Flt. Lt. J. P. E. MAZE, R.A.F.V.R., No. 76 Sqn.
Act. Flt. Lt. W. R. PETTIT, R.C.A.F., No. 199 Sqn.
F/O. J. D. BELL, R.C.A.F., No. 218 Sqn.
F/O. E. J. PHILLIPS, R.A.F.V.R., No. 15 Sqn.
P/O. G. W. GABEL, R.C.A.F., No. 15 Sqn.
P/O. W. F. C. KNIGHT, R.A.F.V.R., No. 218 Sqn.
Act. W/O. P. F. CHESTERTON, R.A.F.V.R., No. 103 Sqn.
F/O. A. BRODIE, R.A.F.V.R., No. 40 Sqn.
F/O. R. L. WESTINGHOUSE, R.A.F.V.R., No. 680 Sqn.
P/O. S. F. GARLAND, R.C.A.F., No. 40 Sqn.
P/O. D. A. MESSINGHAM, R.A.A.F.V.R., No. 23 Sqn.
P/O. P. R. RUDD, R.A.F.V.R., No. 23 Sqn.
Wing Cdr. F. F. RAINSFORD, R.A.F.O., No. 115 Sqn.
Act. Wing Cdr. R. L. BOWES, R.A.F.V.R., No. 44 Sqn.
F/O. K. H. BECROFT, R.N.Z.A.F., No. 218 Sqn.
P/O. H. A. LITHERLAND, R.A.F.V.R., No. 50 Sqn.
Act. W/O. S. G. JOHNSON, R.N.Z.A.F., No. 218 Sqn.
W/O. R. J. CLARK, R.A.F.V.R., No. 100 Sqn.
P/O. J. ALLISON, R.A.F., No. 196 Sqn.
P/O. R. J. ALLEN, R.A.F., No. 196 Sqn.
P/O. T. A. ANGUS, R.C.A.F., No. 115 Sqn.
P/O. H. J. BACKHOUSE, R.A.F.V.R., No. 35 Sqn.
P/O. H. W. R. BAKEWELL, R.A.A.F., No. 101 Sqn.
P/O. J. H. BARNICOAT, R.A.F.V.R., No. 51 Sqn.
P/O. J. BELL, R.A.F., No. 102 Sqn.
P/O. G. G. BOOTH, R.C.A.F., No. 207 Sqn.
P/O. K. J. CAMPBELL, R.N.Z.A.F., No. 196 Sqn.
P/O. M. A. CARTER, R.N.Z.A.F., No. 156 Sqn.
P/O. E. J. CLEMENT, R.A.F.V.R., No. 7 Sqn.
P/O. L. COHN, R.A.F.V.R., No. 97 Sqn.
P/O. P. A. COLDHAM, R.A.A.F., No. 156 Sqn.
P/O. D. H. CRAIG, R.A.F.V.R., No. 35 Sqn.
P/O. A. K. DEAN, R.A.F.V.R., No. 51 Sqn.
P/O. F. C. EDMONDS, R.A.F.V.R., No. 429 Sqn.
P/O. I. L. EDWARDS, R.A.A.F., No. 101 Sqn.
P/O. A. T. ELLIS, R.A.F.V.R., No. 51 Sqn.
P/O. W. H. ETHERTON, R.A.F.V.R., No. 166 Sqn.
P/O. C. R. FABRAR, R.A.F.V.R., No. 10 Sqn.
P/O. A. FEELEY, R.A.F.V.R., No. 83 Sqn.
P/O. A. H. FERNAND, R.A.F.V.R., No. 427 (R.C.A.F.) Sqn.
P/O. L. L. FLETCHER, R.A.F.V.R., No. 100 Sqn.
P/O. E. FRANEY, R.A.F.V.R., No. 100 Sqn.
P/O. M. D. GILLMAN, R.A.A.F., No. 12 Sqn.
P/O. G. P. GODWIN, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
P/O. D. O. G. GOLDFINCH, R.A.F.V.R., No. 161 Sqn.
P/O. J. GRUDZIEN, R.C.A.F., No. 51 Sqn.
P/O. G. HAMILTON, R.A.F.V.R., No. 61 Sqn.
P/O. J. HARBOTTLE, R.A.F.V.R., No. 158 Sqn.
P/O. A. C. HARDING, R.C.A.F., No. 7 Sqn.
P/O. M. A. B. HARDING, R.C.A.F., No. 156 Sqn.
P/O. I. L. J. HOWARD, R.A.F.V.R., No. 35 Sqn.
P/O. L. H. JACOBS, R.A.F.V.R., No. 158 Sqn.
P/O. M. JAMES, R.A.F.V.R., No. 61 Sqn.
P/O. M. G. JENSEN, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
P/O. C. T. KING, R.A.F.V.R., No. 466 (R.A.A.F.) Sqn.
P/O. K. H. KING, R.A.F.V.R., No. 78 Sqn.
P/O. P. M. LOWICK, R.A.F.V.R., No. 7 Sqn.
P/O. W. J. MACPHERSON, R.A.F.V.R., No. 51 Sqn.
P/O. G. W. MANDER, R.A.F.V.R., No. 100 Sqn.
P/O. I. D. MAXWELL, R.A.A.F., No. 101 Sqn.
P/O. K. A. McIVER, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
P/O. D. J. McMILLAN, R.C.A.F., No. 12 Sqn.

SERVICE AVIATION

P/O. B. F. McSORLEY, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
P/O. W. F. MIZON, R.A.A.F., No. 12 Sqn.
P/O. D. A. MONTGOMERY, R.C.A.F., No. 97 Sqn.
P/O. F. S. MOORES, R.A.F., No. 51 Sqn.
P/O. L. W. OVERTON, R.A.F., No. 156 Sqn.
P/O. W. A. OWEN, R.A.F.V.R., No. 158 Sqn.
P/O. C. G. PEARSE, R.A.F.V.R., No. 161 Sqn.
P/O. H. W. PEARSON, R.A.F.V.R., No. 12 Sqn.
P/O. E. A. PENKMAN, R.A.F.V.R., No. 192 Sqn.
P/O. R. G. PRIDDAY, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
P/O. B. C. REID, R.A.A.F., No. 101 Sqn.
P/O. R. C. REYNOLDS, R.N.Z.A.F., No. 156 Sqn.
P/O. F. J. RICHARDSON, R.A.F.V.R., No. 207 Sqn.
P/O. A. E. ROBBINS, R.A.F.V.R., No. 76 Sqn.
P/O. M. J. RYAN, R.A.A.F., No 156 Sqn.
P/O. L. R. SAY, D.F.M., R.A.F.V.R., No. 61 Sqn.
P/O. W. H. SCHMITT, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
P/O. H. SCRIVENER, R.A.F.V.R., No. 10 Sqn.
P/O. D. C. SHEA, R.A.F.V.R., No 61 Sqn.
P/O. J. L. SLOPER, R.A.F.V.R., No. 156 Sqn.
P/O. P. P. SMITH, R.A.A.F., No. 101 Sqn.
P/O. M. C. P. SMITH, R.A.F.V.R., No. 158 Sqn.
P/O. R. F. SMITH, R.C.A.F., No. 77 Sqn.
P/O. F. J. STEER, R.A.F.V.R., No. 102 Sqn.
P/O. H. O. STENBORG, R.A.A.F., No 12 Sqn.
P/O. D. K. STEWART, R.C.A.F., No. 196 Sqn.
P/O. D. J. SULLIVAN, R.A.A.F., No. 467 (R.A.A.F.) Sqn.

Sqn. Ldr. Lance Wade, D.F.C. and two Bars, who was one of the Eagle Squadron pilots and is now fighting in Italy. His father was a member of the famous American Esquadrille Lafayette in France during the last war.

P/O. C. R. SWINNEY, R.A.F.V.R., No. 156 Sqn.
P/O. A. F. TIDMARSH, R.A.F.V.R., No. 51 Sqn.
P/O. G. F. TILLOTSEN, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
P/O. A. T. TUCK, R.A.A.F., No. 35 Sqn.
P/O. I. P. WAKELEY, R.A.F.V.R., No. 196 Sqn.
P/O. V. WATERHOUSE, R.A.F.V.R., No. 156 Sqn.
P/O. A. WHITELAW, R.N.Z.A.F., No. 158 Sqn.
P/O. J. H. WHITING, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
P/O. D. A. C. WILKINSON, R.A.F.V.R., No. 61 Sqn.
P/O. H. C. WILLINGS, R.N.Z.A.F., No. 75 (N.Z.) Sqn.
P/O. W. L. WILLIAMS, R.A.F., No. 83 Sqn.
P/O. R. J. WILLIAMS, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
P/O. F. W. YACKMAN, R.C.A.F., No. 106 Sqn.
W/O. R. J. BLOOM, R.C.A.F., No. 35 Sqn.
W/O. J. A. BROWN, R.C.A.F., No. 57 Sqn.
W/O. A. CHAMBERS, R.A.F.V.R., No. 196 Sqn.
W/O. A. E. COX, R.A.F., No. 460 (R.A.A.F.) Sqn.
W/O. S. F. GAGE, R.A.F.V.R., No. 103 Sqn.
W/O. R. H. GILLESPIE, R.A.F.V.R., No. 49 Sqn.
W/O. L. D. GROOME, R.A.F.V.R., No. 103 Sqn.
W/O. S. HAYWOOD, R.A.F.V.R., No. 100 Sqn.
W/O. E. H. NOXON, R.A.F.V.R., No. 115 Sqn.
W/O. G. W. McI. PURSLOW, R.A.F., No. 12 Sqn.
W/O. S. H. ROGERS, R.A.F., No. 623 Sqn.
W/O. W. H. ROSE, R.A.A.F., No. 156 Sqn..
W/O. R. J. W. RUSSELL, R.A.F., No. 61 Sqn.
W/O. W. WRIGHT, R.A.F., No. 77 Sqn.
Act. W/O. J. E. BARNHAM, R.N.Z.A.F., No. 156 Sqn.
Act. W/O. R. P. COBLEY, R.A.F.V.R., No. 90 Sqn.
Act. W/O. H. F. DANIELS, R.A.F.V.R., No. 97 Sqn.
Act. W/O. R. G. GOODWIN, R.A.F., No. 83 Sqn.
Act. W/O. W. A. HALSEY, R.A.F.V.R., No. 97 Sqn.
Act. W/O. W. H. LAYNE, R.A.F.V.R., No. 97 Sqn.
Act. W/O. J. L. MITCHELL, R.A.F.V.R., No. 75 (N.Z.) Sqn.
Act. W/O. R. F. QUARTERMAN, R.A.F.V.R., No. 101 Sqn.
Act. W/O. J. N. PAPWORTH, R.A.F.V.R., No. 83 Sqn.
Act. W/O. E. J. PRESLAND, R.A.F.V.R., No. 103 Sqn.
Act. W/O. B. A. TEMPLEMAN-ROOKE, R.A.F.V.R., No. 100 Sqn.
Act. W/O. E. WAIN, R.A.F.V.R., No. 199 Sqn.
Act. W/O. E. WHEELER, R.A.F., No. 97 Sqn.
Act. W/O. A. E. WOOLLEY, R.A.F., No. 138 Sqn.
Act. W/O. I. F. W. YOUNG, R.A.F.V.R., No. 156 Sqn.
Act. Sqn. Ldr. N. R. MANSFIELD, R.A.F., No. 156 Sqn.
Act. Flt. Lt. A. S. COOK, D.F.M., R.A.A.F., No. 156 Sqn.
F/O. T. E. DODWELL, R.A.F.V.R.
P/O. K. A. CRANKSHAW, D.F.M., R.N.Z.A.F., No. 156 Sqn.
P/O. H. R. V. WALKUP, R.A.F.V.R., No. 9 Sqn.
P/O. H. J. A. WRIGHT, D.F.M., R.A.A.F., No. 156 Sqn.
Group Capt. N. H. FRESSON, No. 97 Sqn.
Flt. Lt. H. S. HARTLEY, R.A.F.V.R., No. 102 Sqn.
Act. Flt. Lt. T. H. DARGAVEL, R.A.F.V.R., No. 102 Sqn.
Act. Flt. Lt. P. WHITTAM, R.A.F.V.R., No. 57 Sqn.
F/O. A. M. ALEXANDER, R.N.Z.A.F., No. 75 (N.Z.) Sqn.
P/O. J. BOWMAN, R.A.F.V.R., No. 102 Sqn.
P/O. F. W. COSENS.
P/O. H. S. GIFFORD, R.A.F.V.R., No. 57 Sqn.
P/O. H. GOWEN, R.C.A.F., No. 45 (R.C.A.F.) Sqn.
P/O. T. G. L. IRWIN, R.A.A.F., No. 57 Sqn.
P/O. L. W. J. KING, R.A.F.V.R., No. 57 Sqn.
P/O. A. W. LOWE, R.N.Z.A.F., No. 90 Sqn.
Sqn. Ldr. A. D. GRACE, R.A.F., No. 277 Sqn.
Act. Sqn. Ldr. R. J. BENNELL, R.C.A.F., No. 418 (R.C.A.F.) Sqn.
Act. Sqn. Ldr. R. S. GUNNING, D.F.M., R.A.F., No. 88 Sqn.
Flt. Lt. D. H. BLOMELEY, R.A.F., No. 605 Sqn.
Flt. Lt. W. G. BRINN, D.F.M., R.A.F., No. 88 Sqn.
Flt. Lt. G. GOODMAN, R.A.F., No. 29 Sqn.
Act. Flt. Lt. J. R. HEAP, R.A.F.V.R., No. 65 Sqn.
Flt. Lt. B. J. THWAITES, R.A.F.V.R., No. 85 Sqn.
F/O. W. P. CLEMO, R.A.F.V.R., No. 85 Sqn.
Act. Flt. Lt. G. A. MASON, R.A.F.V.R., No. 129 Sqn.
F/O. R. B. HESSELYN, D.F.M., R.N.Z.A.F., No. 222 Sqn.
F/O. J. PATIENT, R.A.F.V.R., No. 139 Sqn.
F/O. F. SHIELD, R.A.F.V.R., No. 418 (R.C.A.F.) Sqn.
P/O. L. J. HAYNES, R.A.F.V.R., No. 432 (R.C.A.F.) Sqn.
P/O. P. D. WHITE, R.A.F.V.R., No. 90 Sqn.
P/O. A. BIRD, R.A.F.V.R., No. 61 Sqn.
Flt. Lt. L. N. McCAIG, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
P/O. J. F. BASSETT, D.F.M., R.A.F.V.R., No. 158 Sqn.
P/O. A. BEEVOR, R.A.F.V.R., No. 214 Sqn.
P/O. W. E. McCREA, R.A.F.V.R., No. 57 Sqn.
Flt. Lt. A. G. BARING, R.A.F.V.R., No. 26 Sqn.
Act. Flt. Lt. G. CRABTREE, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Act. Flt. Lt. A. F. HELMSLEY, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Act. Flt. Lt. R. W. HEPWORTH, R.A.F.V.R., No. 14 Sqn.
Act. Flt. Lt. K. A. WIGGLESWORTH, R.A.F.V.R., No. 32 Sqn.
F/O. P. A. ANDREW, R.A.F.V.R., No. 420 (R.C.A.F.) Sqn.
F/O. L. W. DAFFURN, R.A.F.V.R., No. 47 Sqn.
F/O. L. A. MERRIFIELD, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
F/O. E. L. NIELSEN, R.C.A.F., No. 458 Sqn.
F/O. H. M. RUDEEN, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
P/O. J. H. N. BROUSSEAU, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
P/O. W. E. GILLIS, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
P/O. G. F. KEFN, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
P/O. J. A. LYMBURNER, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
P/O. J. A. F. MEILLEUR, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
P/O. D. J. TURENNE, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
W/O. C. J. O'CONNOR, R.A.A.F., No. 14 Sqn.
Wing Cdr. C. D. TOMALIN, A.F.C., R.A.F., No. 605 Sqn.
Act. Sqn. Ldr. G. C. SEMPLE, R.C.A.F., No. 411 Sqn.
Act. Sqn. Ldr. J. N. WESTCOTT, R.A.F., No. 21 Sqn.
Flt. Lt. G. N. BARGATE, R.A.F.V.R., No. 223 Sqn.
Flt. Lt. G. PANITZ, R.A.A.F., No. 456 (R.A.A.F.) Sqn.
Flt. Lt. A. SHAW, R.A.F., No. 107 Sqn.
Act. Flt. Lt. R. L. M. DAVIDSON, R.A.F.V.R., No. 140 Sqn.
Act. Flt. Lt. C. MASON, R.A.F.V.R., No. 140 Sqn.
Capt. R. R. FARRANT, S.A.A.F., No. 21 (S.A.A.F.) Sqn.
Capt. C. S. MARGO, S.A.A.F., No. 24 (S.A.A.F.) Sqn.
Act. Capt. C. V. STERLEY, S.A.A.F., No. 24 (S.A.A.F.) Sqn.
F/O. D. C. AGER, R.A.F.V.R., No. 18 Sqn.
F/O. E. G. BROWNE, R.A.F.V.R., No. 18 Sqn.
F/O. G. S. COWLEY, R.A.F.V.R., No. 140 Sqn.
F/O. H. J. DOWDING, R.C.A.F., No. 403 (R.C.A.F.) Sqn.
F/O. G. LANSDELL, R.A.F.V.R., No. 114 Sqn.
F/O. F. E. W. HANTON, R.C.A.F., No. 400 (R.C.A.F.) Sqn.

F/O. C. J. HINCHCLIFFE, R.A.F.V.R., No. 114 Sqn.
F/O. A. J. JENKINS, R.A.F.V.R., No. 114 Sqn.
F/O. H. V. PLUMB, R.A.F.V.R., No. 114 Sqn.
F/O. L. G. SMITH, D.F.M., R.A.F.V.R., No. 140 Sqn.
F/O. R. S. WILLIAMS, R.A.A.F., No. 456 (R.A.A.F.) Sqn.
F/O. R. WOOD, R.A.F.V.R., No. 610 Sqn.
Act. Sqn. Ldr. I. K. S. JOLL, R.A.A.F., No. 604 Sqn.
Flt. Lt. J. C. S. DOLL, R.A.F.V.R., No. 91 Sqn.
Act. Flt. Lt. D. P. PERRIN, R.N.Z.A.F., No. 1 Sqn.
F/O. F. E. G. CARMICHAEL, R.A.F.V.R., No. 93 Sqn.
Act. Sqn. Ldr. J. S. SHORTHOUSE, R.A.F., No. 44 Sqn.
F/O. D. B. F. HESLOP, R.A.F.V.R., No. 44 Sqn.
F/O. H. P. JEFFREYS, R.A.F.V.R., No. 102 Sqn.
F/O. R. H. MARSHALL, R.A.F.V.R., No. 44 Sqn.
F/O. J. T. HUTCHINSON, R.A.F.V.R., No. 138 Sqn.
P/O. B. C. DENNISON, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
Act. Sqn. Ldr. E. C. BADCOE, R.A.F.V.R., No. 77 Sqn.
W/O. J. E. THOMAS, R.A.F.V.R., No. 166 Sqn.
Capt. I. L. TAYLOR, S.A.A.F., No. 40 Sqn.
F/O. J. C. K. FABIAN, R.N.Z.A.F., No. 75 (N.Z.) Sqn.
F/O. B. D. JACKSON, R.A.F., No. 429 (R.C.A.F.) Sqn.
F/O. F. WRIGHT, R.A.F.V.R., No. 218 Sqn.
P/O. R. ATKINSON, R.A.F.V.R., No. 166 Sqn.
P/O. A. H. MOORES, R.A.F.V.R., No. 57 Sqn.
P/O. M. W. NESBITT, R.A.F.V.R., No. 623 Sqn.
W/O. R. P. RABETT, No. 166 Sqn.

Conspicuous Gallantry Medal (Flying)

Flt. Sgt. J. V. RUSSELL, R.C.A.F., No. 15 Sqn.—One night in October, 1943, this airman piloted an aircraft detailed to attack Kassel. Whilst making his bombing run the aircraft was subjected to heavy fire from the ground defences, but Flt. Sgt. Russell held to his course and executed his bombing attack. Almost immediately the aircraft was repeatedly hit by machine-gun fire from a fighter. Extensive damage was sustained, causing the bomber to become difficult to control, but, displaying superb airmanship, Flt. Sgt. Russell flew the crippled bomber to an airfield in this country. Although almost exhausted by his efforts, he succeeded in effecting a safe landing.

W/O. A. J. S. WALKER, R.A.F.V.R., and Flt. Sgt. S. MAYER, R.A.F.V.R., both of No. 101 Sqn.—This warrant officer and airman were pilot and flight engineer respectively of an aircraft detailed to attack Hanover one night in September, 1943. In the run-up to the target, the bomber was illuminated by the searchlights and subjected to heavy anti-aircraft fire, while immediately afterwards it was attacked by an enemy fighter. The aircraft was repeatedly hit and sustained serious damage. One of its engines was set alight but, with great coolness, W/O. Walker went into a steep dive and thus evaded the fighter, whilst the force of the wind extinguished the flames. Meanwhile, a fire had started amidships. Flt. Sgt. Mayer, displaying great gallantry and promptitude, made strenuous efforts to prevent the flames from spreading. He succeeded in getting the outbreak under control before he was overcome by the fumes. He was dragged clear, however, and the fire was afterwards extinguished. The situation was very serious but, undaunted, W/O. Walker went on to release his bombs on the target. Displaying superb airmanship, this gallant and resolute pilot flew his crippled bomber to this country, where he effected a safe landing in appalling weather. Throughout the return flight, Flt. Sgt. Mayer rendered material assistance, while his exemplary conduct in the face of imminent danger was beyond praise.

SERVICE AVIATION

Bar to Distinguished Flying Medal

Flt. Sgt. C. F. J. FOWLER, D.F.M., R.A.F.V.R., No. 600 Sqn.—For citation see Flt. Lt. Turnbull, D.F.C. and Bar.

Distinguished Flying Medal

Flt. Sgt. G. V. CURTIS, R.A.F.V.R., No. 114 Sqn.
Flt. Sgt. J. W. HALKETT, R.A.F.V.R., No. 114 Sqn.
Sgt. T. B. COOPER, R.A.F.V.R., No. 18 Sqn.
Sgt. A. W. SWITZER, R.C.A.F., No. 18 Sqn.
Flt. Sgt. W. H. MARSHALL, R.A.F.V.R., No. 138 Sqn.
Sgt. A. V. COLLINS, R.A.F.V.R., No. 166 Sqn.
Flt. Sgt. A. G. HARRIS, R.A.F.V.R., No. 102 Sqn.
Flt. Sgt. N. MCPHAIL, R.A.A.F., No. 102 Sqn.
Flt. Sgt. V. R. MOSS, R.A.F.V.R., No. 102 Sqn.
Flt. Sgt. J. R. T POWER, R.A.F.V.R., No. 102 Sqn.
Flt. Sgt. D. L. T. WELENSKY, R.A.F.V.R., No. 44 Sqn.
Sgt. A. E. MILLARD, R.A.F.V.R., No. 44 Sqn.
Sgt. V. VERNON, R.A.F.V.R., No. 214 Sqn.
Flt. Sgt. S. P. CLARK, R.A.F.V.R., No. 620 Sqn.
Sgt. A. W. DOWSETT, R.A.F.V.R., No. 620 Sqn.
Flt. Sgt. J. A. FAGAN, R.A.F.V.R., No. 7 Sqn.
Sgt. K. JONES, R.A.F.V.R., No. 218 Sqn.
Sgt. W. H. MULLETT, R.A.F.V.R., No. 9 Sqn.
Flt. Sgt. G. C. ALLSOP, R.A.A.F., No. 269 Sqn.
Flt. Sgt. R. J. BURTON, R.C.A.F., No. 10 Sqn.
Flt. Sgt. B. BOLSWORTH, R.A.F.V.R., No. 76 Sqn.
Sgt. G. M. COGGANS, R.A.F.V.R., No. 78 Sqn.
Flt. Sgt. D. A. CHISHOLM, R.C.A.F., No. 10 Sqn.
Sgt. L. E. HOPKINS, R.A.F., No. 10 Sqn.
Sgt. E. E. WAKEFORD, R.A.F.V.R., No. 10 Sqn.
Flt. Sgt. C. W. CHARLTON, R.A.F.V.R., No. 161 Sqn.
Flt. Sgt. L. G. HALL, R.A.F.V.R., No. 161 Sqn.

THE KING has been graciously pleased to approve the following award:—

Military Cross

Act. Flt. Lt. J. N. DOBBIN, R.A.F.V.R.—Acting as an assistant military landing officer, Flt. Lt. Dobbin landed with assault troops one one of the beaches in Italy. The beach was under heavy fire from enemy guns and mortars. Realising the urgency of establishing the beach, Flt. Lt. Dobbin started the organisation in a most prompt and praiseworthy manner, and it was due to his efforts that immediately the first vehicles arrived they were landed and despatched to the assembly area. Later, though wounded by cannon fire from an enemy aircraft, this officer refused to leave his duties. Throughout the whole operation he displayed fine courage and leadership.

Award of a Foreign Decoration

THE KING has granted unrestricted permission for the wearing of the undermentioned decoration conferred on the officer indicated in recognition of valuable services rendered in connection with the war:—

Conferred by the Belgian Government

Military Cross, First Class

Air Vice-Marshal L. D. D. MCKEAN, C.B., O.B.E., R.A.F.

Air Chief Marshal Sir Sholto Douglas, A.O.C. in C. Middle East, decorating R.A.F. personnel at a recent investiture.

Roll of Honour

Casualty Communiqué No. 516.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "On active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list, 100 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—F/O. W. T. Hinds.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. J. M. Bell; Sgt. R. P. Bilham; F/O. P. D. Boyd; Sgt. K. O. Brice; Flt. Sgt. W. A. Brown; Sgt. R. G. F. Bryant; Sgt. A. B. Burgess; Sgt. W. E. Burns; Sgt. E. W. L. Charlebois; Sgt. M. F. Clements; F/O. S. Coshall; Act. Flt. Lt. A. Cowie, D.F.M.; Sgt. G. Easey; Sgt. K. W. Edwards; Sgt. E. A. Hughes; Sgt. L. J. Humphrey; Flt. Sgt. R. R. Jackson; Flt. Sgt. E. K. Jones; Sgt. H. Kay; Sgt. E. G. King; Sgt. J. B. Langley; F/O. E. Lear; P/O. H. Y. MacDonald; Sgt. W. E. Norman; Sgt. A. Pitt; Sgt. L. H. Ransome; Sgt. R. V. Rooke; Sgt. D. J. Smith; Sgt. G. H. Sparkes; Sgt. H. E. Woodruff.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. R. Baker; Flt. Sgt. R. Beavan; Sgt. R. M. Bland; Sgt. L. Booth; Sgt. A. L. Brown; Sgt. J. Conroy; Sgt. K. B. Cooke; Sgt. A. F. Copplestone; Sgt. E. J. Davey; P/O. C. H. Davies; Sgt. E. Davies; P/O. P. A. Davies; Sgt. J. A. Fyle; Flt. Sgt. R. Firth; Flt. Sgt. P. W. Garnham; Sgt. R. K. Hall; Sgt. S. Heywood; Sgt. J. R. Jeffery; Sgt. M. Kleinhorn; Sgt. L. Lamb; Sgt. A. J. C. Lavers; Sgt. G. R. Lewis; Flt. Sgt. F. R. Lewsley; Sgt. R. G. Lines; F/O. H. Lowe; Flt. Sgt. E. F. McHugh; F/O. J. L. Metcalfe; P/O. J. S. Milnes; P/O. F. C. Milton; Sgt. M. C. Moody; Sgt. F. Price; Sgt. W. B. Richards; Sgt. W. Rishton; Act. Sqn. Ldr. A. E. Robinson; Flt. Sgt. J. Rodgers; Sgt. A. R. Saunders; Sgt. J. H. Sibley; F/O. A. R. Skone; Sgt. N. B. Q. Steevenson; Sgt. A. Y. D. Stinton; Sgt. C. M. Taylor; Sgt. W. E. Waddington; F/O. W. B. Wells; Sgt. S. Woodhead; P/O. V. J. Wotton; Sgt. S. A. G. Wraight; Sgt. R. Wrightson.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. C. A. Bonner; P/O. N. E. R. Miles.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—F/O. T. R. B. Hall; Flt. Sgt. T. R. Lumsden; P/O. L. F. Smith, D.F.C.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. F. W. A. Bates; Sgt. A. E. Betts; Flt. Sgt. R. Fall; Sgt. F. M. Freeman; Sgt. R. L. Freeman; Flt. Sgt. T. O. S. McCulloch; F/O. A. B. Potts; F/O. A. Rankin; Sgt. M. J. C. Simpson; P/O. C. H. Spiers; Flt. Sgt. D. A. Webster.

MISSING.—Sgt. L. Allen; Sgt. E. G. W. Barlett; Sgt. P. Barnsley; Sgt. A. R. Bish; F/O. G. W. Bond; Act. Flt. Lt. A. Booth; W/O. A. L. Brigden; Sgt. J. S. Broad; Sgt. T. F. Clements; Sgt. D. Cockerill; Flt. Sgt. T. C. Cooper; F/O. A. Crockford; F/O. P. Crozier; P/O. S. J. Dudley; Sgt. H. A. Eaton; Flt. Sgt. N. S. Ewart; P/O. R. J. Gerrett; Sgt. R. L. Graham; Act. Sqn. Ldr. R. M. Graham; Sgt. J. E. Gray; Flt. Sgt. H. T. Harvey; Sgt. D. C. Hill; F/O J. P. Hutton; F/O E. C. Johnson, D.F.C.; P/O. T. D. L. Leslie; Sgt. R. W. A. Lindsey; Sgt. D. W. S. McCartney; Flt. Lt. G. A. Mason; Sgt. J. Milligan; Sgt. C. J. B. Moody; Sgt. G. L. Odgers; Sgt. G. Ogden; Flt. Sgt. M. R. O'Hara; Flt. Lt. H. L. Parry; F/O. H. G. Paskey; F/O. C. J. Payne; Sgt. R. J. Renton; Flt. Sgt. E. Robinson; Flt. Sgt. G. V. Rogers; Sgt. K. A. Shrewsbury; Sgt. T. Smale; Sgt. G. P. Smith; Act. W/O. S. W. Smith; Sgt. M. Stacey; Flt. Sgt. G. L. Taylor; Wing Cdr. J. G. Towle; Sgt. J. Toyne; Sgt. G. Vardy; Sgt. L. Vaughan Harrison; Sgt. E. Vose; Sgt. C. Westwood; Sgt. R. Wildbore; Sgt. W. C. L. Wood; Flt. Sgt. L. C. Wollard; Sgt. E. Wray.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. J. Dale; F/O. J. R. Harrold; Sgt. W. Newton; P/O. T. A. Pittock; Sgt. W. Shepherd; Sgt. F. G. Wells.

KILLED ON ACTIVE SERVICE.—Sgt. J. D. Arthur; Sgt. K. C. Blanch; Sgt. J. G. Boundy; F/O. L. A. Buck; Sgt. G. W. Clements; L.A/C. K. W. Coaster; Sgt. R. E. Dolling; Sgt. J. Donnachie; F/O. J. Gibson; Sgt. J. R. Grimmond; Sgt. J. W. Hallam; Sgt. B. W. Lambert; F/O. M. W. Moore; L.A/C. S. S. Mowat; Sgt. G. E. Newall; Sgt. L. S. Pennell; Sgt. S. W. Poynts; Sgt. H. L. Scarborough; Sgt. W. R. J. Spry.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. T. F. Blythe; P/O. P. F. Franklin; F/O. J. K. A. Pickering.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. J. W. Eunson; L.A/C. J. B. Hodge; Sgt. L. R. Little; Flt. Sgt. J. H. Newton.

DIED ON ACTIVE SERVICE.—Sgt. H. Blundall; A/C.2 A. L. Boswell; Sgt. W. Brister; L.A/C. J. Campbell; Sgt. G. W. Cook; A/C.2 R. W. Elson; L.A/C. G. Greenhall; Cpl. W. D. Gunn; P/O. W. R. Hurst; A/C.1 J. T. Midlemiss; A/C.1 W. Morrison; W/O. J. Pendry; L.A/C. D. G. Prout; A/C.1 C. J. J. Rees; A/C.2 W. P. M. Regan; Sgt. K. H. Robertson; L.A/C. A. Saliba; Sgt. W. D. Saunders; Cpl. R. A. Smith; A/C.1 S. J. Smith; Flt. Sgt. J. Smyth; A/C.1 C. T. Stevens; L.A/C. J. H. Tomlinson.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. R. C. Belling-

SERVICE AVIATION

ham; Flt. Sgt. H. P. Gordon; Flt. Sgt. F. D. Holdsworth; Flt. Sgt. G. W. Murtagh.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. J. V. Conlon; P/O. S. C. Methven.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. B. H. Bishop; Sgt. P. R. Mitchell; Sgt. H. A. Phillips; P/O. L. E. Reeve; Sgt. A. H. Borrett; P/O. F. J. Silk.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. C. K. Gilkes; Flt. Sgt. G. R. Greaves.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. D. E. Reddy.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. R. B. McPhan; Flt. Sgt. J. A. Spence.

MISSING.—P/O. S. V. Brown; Flt. Sgt. J. G. Collins; F/O. D. O. Cull, P/O. N. R. Frazer; Flt. Sgt. J. Marsh; Flt. Sgt. S. H. May; Flt. Sgt. J. C. Munro; F/O. J. W. Pike; P/O. A. T. Richards; P/O. J. H. Short; F/O. G. H. Waddell; Flt. Sgt. L. A. Watson.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. A. W. Buxton; Flt. Sgt. G. A. J. Daldy; Flt. Sgt. N. N. Dunn; Flt. Sgt. R. Frith; Sgt. H. A. Newham.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. F. R. G. Strickland.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. B. Fisher; Flt. Sgt. H. F. Locke; Sgt. F. L. Olsen; P/O. E. C. Patterson

MISSING.—F/O. H. E. Davis; Sgt. H. L. Douglas; Sgt. W. J. B. Ingram; Flt. Sgt. A. B. Jackson; Flt. Sgt. J. A. R. Langlois; Sgt. J. McDonald; Flt. Sgt. H. C. MacMillan; Sgt. C. F. Phillips; F/O. A. Pitkethly; Flt. Sgt. J. H. Sills; Flt. Sgt. A. D. Steadman; Flt. Sgt. F. E. Sutherland; Flt. Sgt. J. H. Tovey.

KILLED ON ACTIVE SERVICE.—P/O. B. E. Brown; P/O. H. Farrer.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—LA/C W. A. Allan; P/O. H. F. Burt-Gerrans; Sgt. D. L. Erickson.

DIED ON ACTIVE SERVICE.—P/O. E. W. Anderson.

Royal New Zealand Air Force

KILLED IN ACTION.—Flt. Sgt. G. G. Bell; Flt. Sgt. W. Jones.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. V. E. Spain.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. F. B. Boaden; Sgt. M. T. Denham; Flt. Sgt. A. L. Groves; Sgt. S. S. Vinicombe.

MISSING, BELIEVED KILLED IN ACTION.—P/O. M. A. Erickson; P/O. J. Third.

MISSING.—Flt. Sgt. L. F. Harris; Flt. Sgt. F. W. Thorstensen.

DIED ON ACTIVE SERVICE.—A/C.1 T. M. Scott.

South African Air Force

KILLED IN ACTION.—2/Lt. J. H. Cook; Lt. M. B. Hall; 2/Lt. T. D. A. Leoander; Lt. S. Meijer.

WOUNDED OR INJURED IN ACTION.—Capt. E. A. Endler.

Casualty Communiqué No. 317.

Of the names in this list, 115 are second entries giving later information of casualties published in earlier lists

Royal Air Force

KILLED IN ACTION.—F/O. H. E. Bazell; Sgt. J. L. E. Blake; Sgt. H. J. Davey; Sgt. C. A. Gough; Sgt. J. S. Gunn; Sqn. Ldr. J. W. E. Leighton; F/O. R. Noble; Flt. Sgt. G. C. Stringer.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. H. W. Austin; Sgt. W. P. Baxter; Sgt. R. D. Benning; Sgt. A. Benson; Sgt. T. A. Bird; Sgt. H. E. Blundell; Sgt. A. M. Coulthard; Sgt. H. W. Fields; Sgt. G. F. Fletcher; P/O. E. G. Francis; Sgt. E. T. D. Hardee; Sgt. J. A. Hawkins; Sgt. A. Herbert; F/O. E. Hesketh; Sqn. Ldr. F. A. Holmes, D.F.C.; Sgt. T. Hughes; Sgt. A. J. Jackson; Sgt. L. C. Lampen; P/O. J. McMaster; Sgt. D. H. Mactier; F/O. A. F. Paramore; Sgt. F. T. Pratt; Sgt. T. W. Shadgett; Sgt. N. G. Stopford; Sgt. C. W. H. Westwood; Sgt. R. D. Wood.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. D. Adam; Sgt. L. E. Ashdown; Sgt. W. K. Barton; Sgt. J. V. Branscombe; P/O. R. G. Brinkworth; P/O. D. J. Brown; F/O. J. H. Brown; Sgt. F. A. Cavadino; Sgt. D. G. J. Coombes; P/O. M. G. Coyle, D.F.M.; F/O. T. Dring; Sgt. H. Gibson; Sgt. R. K. Guy; Flt. Sgt. I. C. Haines; Sgt. T. E. Hall; Sgt. N. Hallett; Sgt. J. Harris; P/O. J. D. Hayes; F/O. W. M. Henderson; Flt. Lt. D. Higson; Wing Cdr. C. C. Hodder, A.F.C.; Sgt. A. Howarth; Sgt. W. Johnson; Sgt. W. T. Jones; Sgt. T. C. Laws; Sgt. H. Liddell; F/O. R. H. Longhorn, D.F.M.; P/O. P. G. Lyon; Sgt. J. McGrane; F/O. H. North; P/O. F. E. O'Hare; Act. Sqn. Ldr. A. M. Paape, D.F.C.; F/O. E. Payling; P/O. W. H. Perinchief; Sgt. S. Phillips; Sgt. D. B. Ralston; Sgt. J. Rawcliffe; Sgt. T. Rich; Flt. Sgt. J. Richards; Sgt. W. G. Richardson; Flt. Sgt. C. W. Roberts; Sgt. D. J. R. Robinson; F/O. G. Pounder; Sgt. J. Rostron; P/O. T. C. Roux; Sgt. D. L. Rowland; F/O. J. W. Scott; Sgt. C. Smith; Sgt. E. F. Smith; Sgt. A. Stevens; F/O. J. M. Stewart, A.F.M.; Sgt. G. Sutton; Sgt. A. Waterworth; P/O. C. J. Whittingham; Sgt. H. E. Witham.

WOUNDED OR INJURED IN ACTION.—Sgt. R. W. Barber; Sgt. R. Brown; W/O. E. M. Cartwright; Flt. Sgt. H. A. Clifford; Sgt. G. R. Fletcher; Sgt. D. J. Nicholson; Sgt. A. W. Snowden.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Flt. Sgt. D. Goodman; Sgt. P. F. Jones.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. C. Dove; Sgt. A. C. Goss; Sgt. R. Graham; Sgt. R. Hindmarch; Sqn. Ldr. G. W. Holden, D.S.O., D.F.C.; Sgt. D. V. Humberstone; P/O. G. Kay; P/O. W. King; Sgt. D. E. Owen; Sgt. F. G. Scarr; Sgt. G. E. Smith; Flt. Sgt. J. E. Wintie.

MISSING.—Sgt. D. Allaitson; Act. Flt. Lt. R. A. P. Ailsebrook, D.S.O., D.F.C.; Sgt. W. S. Backway; Sgt. A. V. M. Barron; P/O. G. A. Berwick; Sgt. E. C. A. Blake; P/O. N. A. Botting; Sgt. R. H. D. Bouttell; Sgt. V. G. E. Briant; F/O. J. W. H. Brown, D.F.M.; Sgt. C. A. Budd; Sgt. B. S. Burch; F/O. H. Burke, D.F.M.; Sgt. R. T. Chinn; Sgt. E. Clayton; P/O. G. L. Coxon, D.F.M.; F/O. N. F. Crisp; P/O. W. G. Divall; Sgt. S. T. Flatman; Sgt. H. A. Freeman; Sgt. H. Fulton; Sgt. W. A. Gilbert; F/O. J. M. Grant, D.F.C.; Sgt. W. Green; Sgt. R. T. Hampton; P/O. C. Hegworth; Flt. Sgt. S. Hitchen; Sgt. J. L. Holding; Flt. Sgt. E. Hornby; Flt. Sgt. A. Hughes; Sgt. B. A. C. Hunt; Act. Flt. Lt. R. E. G. Hutchison, D.F.C.; P/O. D. B. Ireland; Sgt. J. E. Irwin; P/O. W. H. James; P/O. T. W. Johnson; Sgt. H. Johnston; Sgt. I. G. Jones; Sgt. G. E. Kane; Sgt. E. D. Kite; Sgt. C. M. Knox; Sgt. E. Le-Huray; Flt. Sgt. R. B. S. Lulham; Flt. Sgt. R. C. McArthur; F/O. D. H. McLaughlan; Sgt. A. W. Marsh; P/O. T. A. Meikle; P/O. G. S. Miles; Sgt. C. Mollison; Flt. Sgt. P. Moore; Sgt. L. O. Mott; Sgt. J. T. Mullany; Flt. Sgt. T. H. Payne; Sgt. H. Pennell; Sgt. T. K. P. Peters; Sgt. D. J. D. Powell; Flt. Sgt. J. McK. Prentice; F/O. H. J. Pringle; Sgt. G. F. Pyott; Sgt. T. A. Roberts; P/O. J. A. Rodger; Sgt. K. Saville; Sgt. L. E. Scarisbrick; Flt. Sgt. J. F. Sedgwick; Sgt. J. M. Shand; Sgt. N. Shapeley; Sgt. F. G. Shaw; Sgt. F. C. Shergold; Flt. Sgt. N. L. Sherwood; Flt. Sgt. J. S. Simpson; Sgt. R. Skillin; Sgt. A. S. Taylor; Sgt. E. S. Taylor; Sgt. G. R. Thomas; Flt. Sgt. W. Walker; Sgt. A. A. Williams; Act. Flt. Lt. H. S. Wilson.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—L.A/C. J. Smith.

KILLED ON ACTIVE SERVICE.—Sgt. H. J. B. Ashwin; Flt. Lt. R. T. Bowen; Sgt. J. Colhoun; Sgt. E. Davies; F/O. B. F. Dill-Russell; Flt. Lt. J. E. Fairchild; Sgt. J. M. Fearn; Sgt. E. Gates; Flt. Sgt. B. Green; A/C.1 A. Groves; Sgt. T. Johnston; Sgt. P. Jones; Flt. Sgt. R. M. Kershaw; P/O. R. Kirkpatrick; L.A/C. S. Lathrope; Sgt. A. A. Owen; Flt. Sgt. P. Owen; Sgt. W. G. Perkins; Sgt. G. C. Walker; Sgt. C. S. Walters.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. J. Finn.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. F. C. Adams; P/O. A. H. Athill; Sgt. E. S. Bala; P/O. J. D. Birch; P/O. P. D. O'D. CAREY, Sgt. J. Collingridge; Sgt. R. H. Credland; P/O. D. A. Desmond; Flt. Lt. A. R. Fogge; P/O. R. W. Fray; P/O. E. W. Furminger; P/O. C. M. Lawry; Sqn. Ldr. C. G. H. E. Lumsden; P/O. A. A. Marcus; P/O. J. K. Murray; P/O. G. H. W. Pettigrew; P/O. R. D. Powell; P/O. J. S. Smith; P/O. K. S. Toms; P/O. S. R. Tuck; P/O. D. J. Virgo; P/O. C. A. T. Walshaw; P/O. G. A. Webb.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. M. Read; F/O. I. Reid.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Flt. Sgt. A. R. Cook; P/O. E. A. Nutt; Sgt. R. Whyte.

DIED ON ACTIVE SERVICE.—L.A/C. A. F. Fagence; Sgt. R. T. Frary; A/C.2 C. Kitcher; Flt. Lt. L. C. Murch.

Royal Australian Air Force

MISSING, BELIEVED KILLED IN ACTION.—P/O. W. L. Topp.

MISSING.—Flt. Sgt. A. A. Cranfield; Flt. Sgt. K. Galt; Flt. Sgt. H. R. Lucy; Flt. Sgt. E. M. Sibbit; P/O. C. K. Smith; Flt. Sgt. G. F. Snook; F/O. F. M. Spafford, D.F.C.; F/O. M. T. L. Watson.

KILLED ON ACTIVE SERVICE.—Flt. Lt. N. G. Stewart; F/O. P. R. Wilmot.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. D. H. Lewis.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. L. G. Boyd; Flt. Sgt. R. W. Calvert; P/O. G. A. Deering, D.F.C.; Flt. Sgt. V. J. A. Wintzer.

MISSING.—F/O. E. N. Bell; Flt. Sgt. G. E. P. Birtch; F/O. J. R. Bradley; Flt. Sgt. W. D. L. Cameron; P/O. G. H. Coles; Act. Flt. Lt. J. M. Forman; Act. Flt. Lt. C. J. D. Greenland; F/O. H. A. N. Kitchen; Act. Flt. Lt. E. B. Mason; W/O L. Miegette; P/O. J. M. Nelmes; Flt. Lt. H. T. Taerum, D.F.C.; F/O. D. W. Warwick; Act. Sqn. Ldr. R. P. Wilkin, D.F.C.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. A. J. Chabara; Sgt. E. A. Opie; Sgt. H. W. Scott.

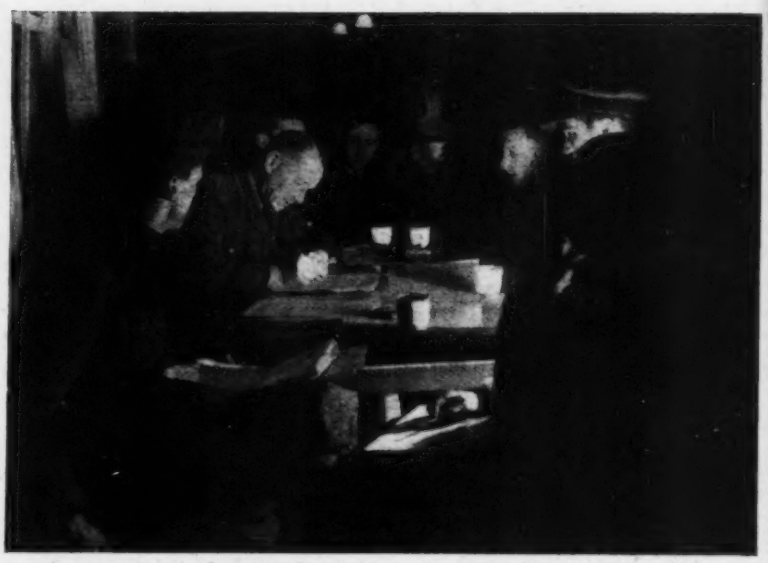
PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. H. Dewar; W/O. C. R. Munson.

Royal New Zealand Air Force

MISSING.—F/O. L. D. Glenday; W/O. A. W. Niall; P/O. N. E. Preston; F/O. I. S. A. Stevenson; Flt. Sgt. N. N. Wakely.

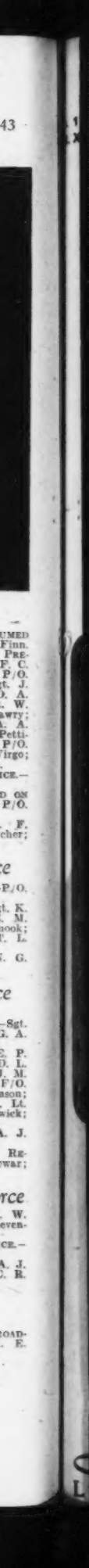
WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. I. J. Williamson.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. E. A. J. Bradford; Flt. Sgt. R. V. Griffiths; F/O. C. R. Morse.



Interrogation of a Lancaster bomber crew after one of the big raids on Berlin.

Official Corrections

Casualty Communiqué No. 315.

Under "MISSING," delete Sgt. G. W. BROADBENT, P/O. E. M. FARRINGDON, and Sgt. E. MOSEY.